Nov. 1929

Electrical Manufacturing

Vol. 4 A Gage Publication No. 5

173 LEADING MANUFACTURERS
ARE MAKING THEIR PRODUCTS
TROUBLE-FREE BY ADOPTING
THESE PATENTED EMBEDDED TYPE
CHROMALOX HEATING UNITS
Mfg. Exclusively by EDWIN L. WIEGAND CO. •• 7500 THOMAS BLVD. •• PITTSBURGH, PA.

Belden
Soft Rubber Plugs
are now standard equipment on the following:

20 Washing Machines
19 Radio Units
14 Medical Equipments
11 Electrical Tools
4 Refrigerators
3 Paint Sprayers
3 Business Machines
2 Vacuum Cleaners
2 Floor Machines
2 Portable Saws
2 Grinders
18 Miscellaneous Machines

Available on a wide selection of Belden Rubber Covered and Braided Wire. Lengths and end trimming to your specifications.

Industry Has Adopted the Belden Soft Rubber Plug

MANUFACTURERS of appliances such as electrical tools, on which cords and plugs are subjected to extremely hard service, have been quick to appreciate the unbreakable feature of Belden Soft Rubber Plugs.

Today, manufacturers of equipment which is seldom moved, such as electrical refrigerators, are also rapidly equipping their machines with the Belden Soft Rubber Plug, because it prevents trouble calls, complaints, and payment delays that occur due to breakage that is inherent in ordinary plugs.

The Belden Unbreakable Soft Rubber Plug is furnished as part of the Belden Cut Cord Service, in black and brown, with or without the long handle.

You should have the facts that have caused so many manufacturers to adopt the Belden Unbreakable Soft Rubber Plug. Write for them today.

BELDEN PRODUCTS

Beldenamel and Textile Magnet Wire
Coil Windings
Beldenmold (Molded Bakelite Products)
Automotive Wires and Cables
Airplane Assemblies
Radio Wires, Cords and Cables
Rubber Covered Wires
Armored Cables
Flexible Armature Wires
Motor Lead Wires
Braided and Stranded Copper Cables
Cotton Sleeving

Belden Manufacturing Company
2310-B South Western Ave. Chicago, Ill.

Specify Belden

Applied Satisfaction

When, after the most exacting experimental tests have been completed, the Laboratory Engineer puts his "O.K." on a motor—that does not necessarily mean it will satisfy the user. Some unusual load or operating condition may bring a serious fault to light.

But—when motors have been faithfully doing their work under conditions ranging from easy service to down-right abuse—

That is real proof of a motor's stamina.

In shops, factories, foundries, bakeries and homes—on farms and ranches—in spotlessly clean rooms—in dust, dirt and grime—in properly protected and entirely exposed places—under good care or absolute neglect.

Thousands of Master Motors are standing the gaff.

That's the kind of a motor you want. We will appreciate the opportunity to tell you about Master Motors and how well the Master Organization can serve you.

The MASTER ELECTRIC Co.
DAYTON, OHIO

STOCKS CARRIED IN PRINCIPAL CITIES

More Than 100 Service Stations

MASTER GUARANTEED MOTORS

1/20 TO 10 H.P. — Dayton THE MASTER ELECTRIC CO. Ohio — **not more than 40°**

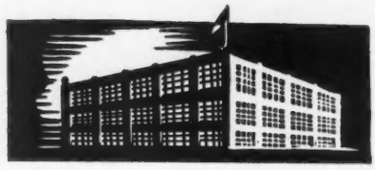
50,000 MORE FEET OF FLOOR SPACE for QUICK SERVICE

A new building just being completed is adding 50,000 ft. to the space which Formica has available to provide prompt service to its customers.

Practically every year for the last ten, additions have been made to plant to provide more space and equipment.

There is available at a point where quick shipments can be made to any part of industrial America - - - the largest equipment for the production of sheets, tubes and rods, and the largest fabricating equipment in the industry.

A specialized organization has concentrated on just one product for 16 years.



The FORMICA INSULATION CO.
4638 Spring Grove Avenue
CINCINNATI, OHIO

FORMICA
Made from Anhydrous Bakelite Resins
SHEETS TUBES RODS

Electrical Manufacturing

Reg. U. S. Patent Office

Volume 4 | NOVEMBER, 1929 | Number 5

Stanley A. Dennis, *Editor*

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Managing and Engineering Editor

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LESLIE H. ALLEN, *Associate Editor*
IRWIN ROBINSON, *News Editor*
ROGER L. KNIGHT, *Associate Editor*

ELECTRICAL MANUFACTURING'S editorial program has the following objectives:

Production

To help all electrical manufacturers, including makers of motor-driven products, increase the product's salability, cut unit production costs, quicken turnover, reduce overhead expenses, establish standard methods of work, and spread a better knowledge of raw materials and parts.

Marketing

To spread a better knowledge of and aid electrical manufacturers in adjusting sales management to the buyers' market, to aid in making advertising more effective, finding the most profitable distribution channels, and promoting cooperative market development.

Administration

To further the working out of sounder management policies and better executive control, coordinating sales and production schedules, promoting research, and developing better industry relations.

Repairing

To help all motor repair shops to build better business by developing a sounder organization, improving management, policies and methods, and developing a keener merchandising point-of-view on the business.

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Chicago Office: 731 Monadnock Block, L. C. Bassett, *Manager* **Cleveland Office:** 501 Caxton Building, Harry Krohn, *Manager*

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Announcing The

THE MONOWATT ELECTRIC CORPORATION, strongly financed and personneled, has purchased the Connecticut Molded Products Corporation, makers of "CETEC," and is now prepared to offer you complete service in the manufacture of *Hot* or *Cold* molded products. The main office is at Bridgeport, Connecticut, with factories at Bridgeport and Meriden, and general sales offices at New York and Chicago.

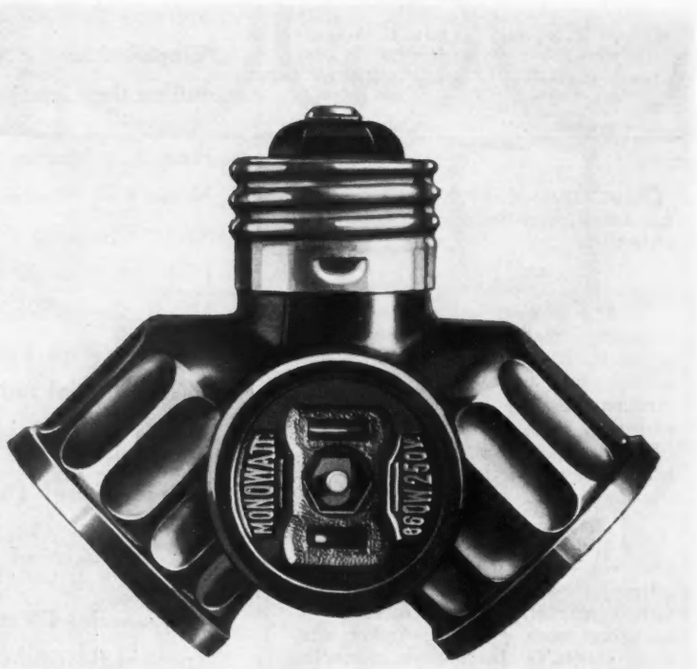
We have a modern factory and an efficient, economical set-up that can give real service. We are small enough to be versatile—large enough to take care of any job.

A large sum of money has been appropriated for new machinery of the latest type, much of which has already been installed.

Monowatt also features:

—a chemical staff,
—an engineering staff,
—a research staff,
—a development staff.

We can meet your specifications in Hot and Cold molding.



This Means Production on Time

The key to production of molded products is the tool room. We have an unusually large organization of tool makers, trained in the business—who can hop on to any job. We believe that we are very fortunate in this respect; and that we will normally be able to give better service than you can get elsewhere.

MONOWATT

MONOWATT
Electric Corporation
Makers of *hot* and *cold* molded products

Precision — and precision — and precision — are the watchwords of our tool department. Things simply must be right. Excuses don't go.

Our Sales Engineers Go Anywhere—Quickly!

As service is the keystone of this business we have a strong, capable staff of sales engineers, who under our new policies will be geographically distributed to give quick action on any inquiries. The entire sales force of the Connecticut Molded Products Corporation has been retained.

Prompt Delivery

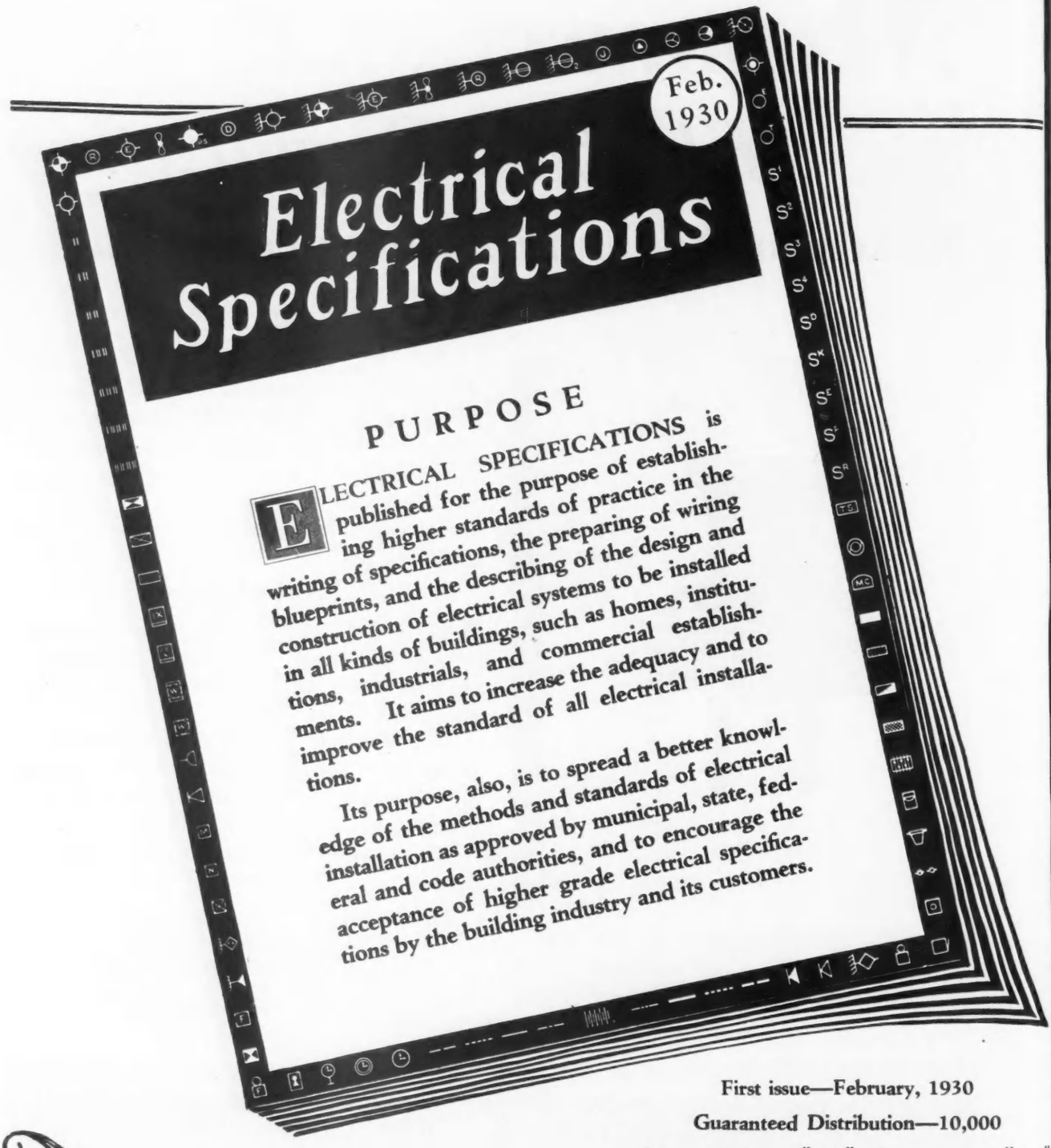
If you are interested in prompt deliveries, we suggest that you get in touch with us concerning your requirements for hot and cold molded products.

Monowatt has the capital, the facilities, the personnel to handle a large volume of business and we believe that our unusual ability to give prompt service will interest manufacturers exceedingly. We will be glad to receive your inquiries.

THE MONOWATT ELECTRIC CORPORATION
24 West 40th Street, New York
427 West Randolph Street, Chicago
Factories: Bridgeport and Meriden, Conn.
Sales Offices: New York and Chicago

Electric CORPORATION

A new GAGE


Feb.
1930
Electrical
Specifications
PURPOSE
ELECTRICAL SPECIFICATIONS is published for the purpose of establishing higher standards of practice in the writing of specifications, the preparing of wiring blueprints, and the describing of the design and construction of electrical systems to be installed in all kinds of buildings, such as homes, institutions, industrials, and commercial establishments. It aims to increase the adequacy and to improve the standard of all electrical installations.
Its purpose, also, is to spread a better knowledge of the methods and standards of electrical installation as approved by municipal, state, federal and code authorities, and to encourage the acceptance of higher grade electrical specifications by the building industry and its customers.

First issue—February, 1930

Guaranteed Distribution—10,000

Trimmed Size—9″x12″; Type page—7″x10″

business paper

for the Architect, Electrical Engineer, Builder, Electrical Inspector and all those consultants who specify, influence or approve the ultimate choice of electrical equipment entering into building or construction projects

EVERY electrical product sales executive that is interested in effective straight line advertising looking toward the ultimate of increased market consumption, should be vitally interested in the announcement of ELECTRICAL SPECIFICATIONS.

Now, for the first time, the manufacturer of all types of electrical equipment that is specified in building construction can go direct, without waste, to the key factors involved.

ELECTRICAL SPECIFICATIONS plugs the gap that has hitherto existed. It provides direct market cultivation through a medium possessing a specific *electrical* background of authority.

The new avenue of approach to these specifiers and influencers, has possibilities that will at once be apparent to those who have been obliged in the past to scatter their effort in a hit or miss attempt to effectively reach these groups.

The groups have one thing in common today—the eagerness to learn about better and approved electrical practice and its interpretation into their planning and specification writing.

Before deciding upon the 1930 program look into the possibilities offered you by ELECTRICAL SPECIFICATIONS.

THE GAGE PUBLISHING CO., INC.

461 Eighth Avenue, New York, N. Y.

Publishers to the Electrical Industry Since 1892

ELECTRICAL RECORD - ELECTRICAL MANUFACTURING
ELECTRICAL SPECIFICATIONS - METROPOLITAN ELECTRICAL NEWS
GAGE LIST OF ELECTRICAL BUYERS

10 YEARS AGO TODAY 10 YEARS FROM NOW

10 years ago the commercial world was just awaking to the broad possibilities of Bohnalite—the light alloy that is 62% lighter than iron yet just as strong.

Today Bohnalite has replaced iron in a wide variety of industries because of its many marketing advantages, as well as the ease and economy with which it can be handled in the shop.

10 years from now Bohnalite we believe will be universally used and will be as standard as steel.

Why don't you investigate today? Why wait for tomorrow? Why give your competitors a chance to have "an edge" which your shop and selling organization may enjoy today?

Write for Bohnalite literature. Send samples of your castings with blue prints.

BOHN ALUMINUM & BRASS CORPORATION, DETROIT, MICH.
New York Chicago Philadelphia Cleveland Pittsburgh

CHAS. B. BOHN
The authority who developed Bohnalite

BOHNALITE

62% LIGHTER THAN IRON

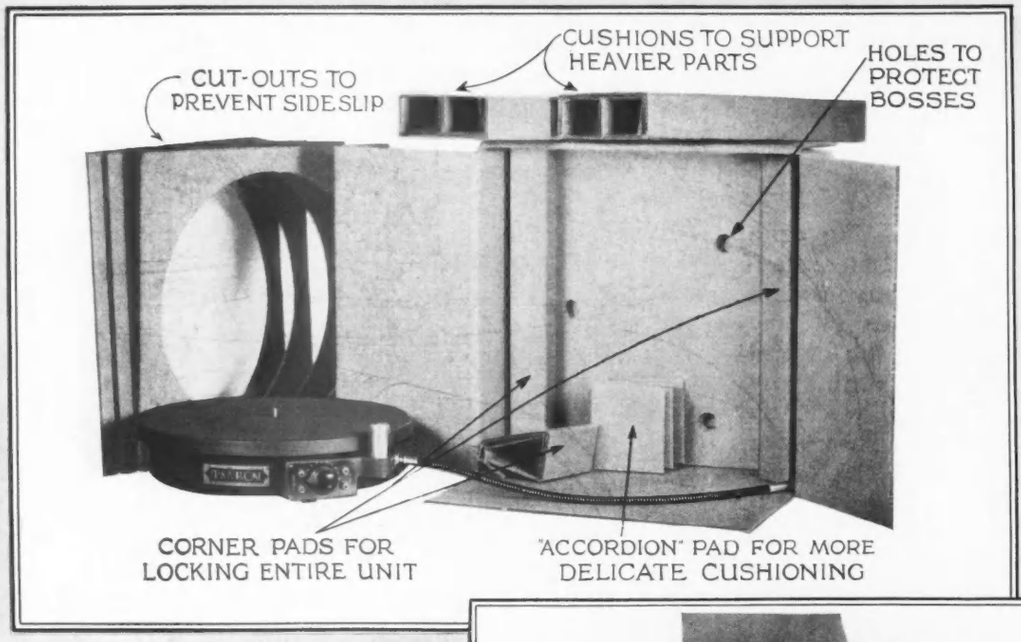
GAIR CORRUGATED SHIPPING CASES

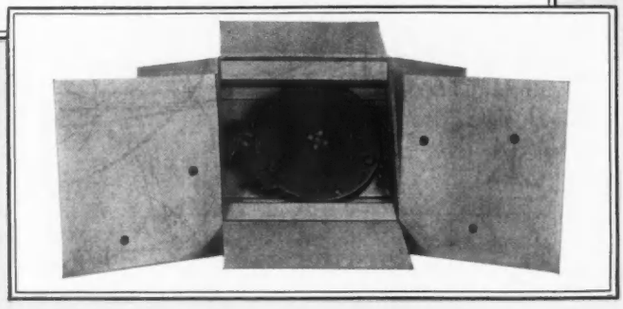
With his gesticulating cane a professor whacked an untenanted wasp's nest into flinders in the course of his solitary woodland walk—so the legend goes. To him, the drab, gray particles looked like Kraft (Strong) Paper. They were incipient Kraft. ¶ Wood macerated by the industrious insects gave the clue to the chemical processes for making Pulp in its various forms and grades. Many substitute wood bi-products are used in making Liners for Corrugated Cases, but the Gair Tan-Brown Corrugated Cases have all the toughness and stability of the original Kraft. ¶ We like to serve the inquiring, particular and technically informed Buyer of Corrugated Cases. His criticism, suggestions and repeat orders are evidence of intimate confidence. He has Corrugated Case ideas of his own. We respect them and study them, and nine times out of ten bring in our Creative and Design Department to put maximum safety and economy into his Shipping Cases if there is a chance to do so. ¶ We also put sunshine into the color printing that is displayed on rugged boxes that resist the freight - handler's practical knocking about.

ROBERT GAIR COMPANY

420 LEXINGTON AVENUE, NEW YORK

GAIR CORRUGATED SHIPPING CASES


CUT-OUTS TO PREVENT SIDESLIP
CUSHIONS TO SUPPORT HEAVIER PARTS
HOLES TO PROTECT BOSSES
CORNER PADS FOR LOCKING ENTIRE UNIT
"ACCORDION" PAD FOR MORE DELICATE CUSHIONING



There is something typical about the Gair Corrugated Case. This is due to the day in and day out continuous manufacture of the standardized Jute Liner and tough Oat Straw that goes into it. ¶ Matter-of-course details, such as the number of arches to the lineal foot, the weight per thousand square feet and the pressure test are controlled by well-known regulations—every honest Corrugated Case that has not undergone the devitalizing operation of cost-pinching and quality-clipping should conform with these regulations, as Gair Corrugated Cases do. ¶ With experience, it is possible to devise Corrugated Containers in which delicate, fragile articles are poised, kept in equilibrium, afloat between the walls, and free from vibratory shock. We share largely in that experience.

ROBERT GAIR COMPANY

420 LEXINGTON AVENUE, NEW YORK

PAPER TUBING OF ALL SHAPES FOR COIL WINDING

Manufactured by machine under

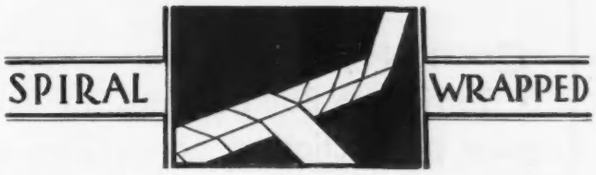
JAUCH PATENTS

No. 1,625,470 and No. 1,625,471 (others pending)

NOW YOU can have accurate, machine-made paper or fibre tubing of any shape or thickness for coil winding!

Square, oblong, hexagonal, triangular, octagonal, square with rounded corners—all of these shapes are available.

This tubing is built up layer by layer, with each lamination securely cemented to the next. It is spiral wrapped in a diagonal or criss-cross manner to give the side walls greater strength. (See illustration below.)



The stock used is manufactured according to the most rigid specifications under a process during which magnetic extractors remove mineral and metallic matter. Likewise, the cementing materials are carefully selected so that they will not affect the smallest enameled wire.

The tubing has a high dielectric test, great rigidity, and freedom from blisters.

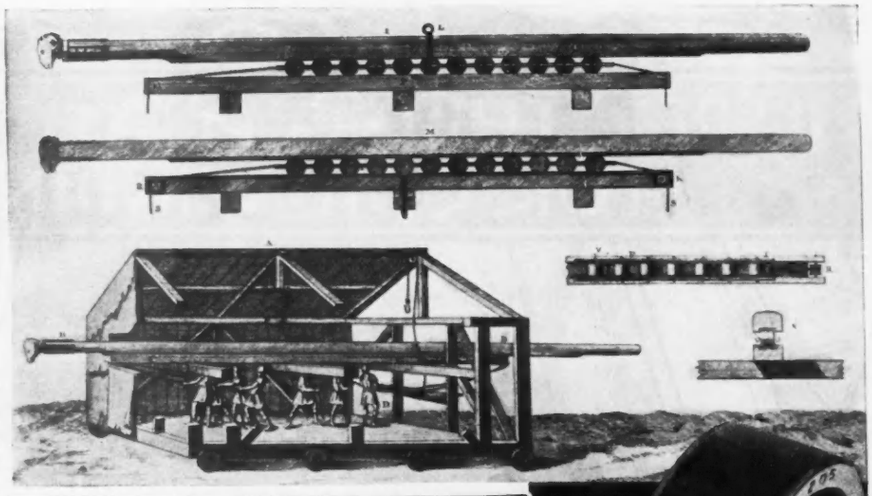
Samples and full details regarding this patented tubing will be sent gladly to radio and electrical manufacturers interested in securing the best and most economical coil foundations.

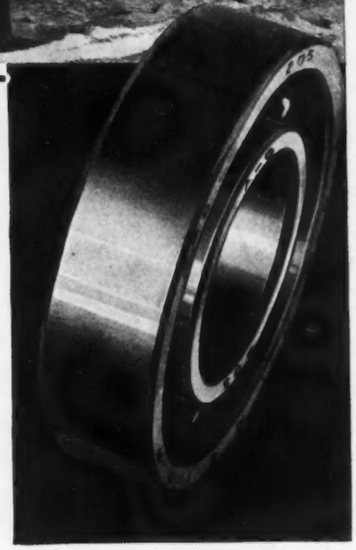
THE PAPER TUBE COMPANY

Manufacturers of Spiral-Wrapped Tubing for the Electrical Industry

1718-20 N. DAMEN AVE. PTC TRADE MARK SPIRAL-WRAPPED CHICAGO, ILLINOIS

The WORLD FIGHTS





FRICTION

The Greeks and Romans, with slave labor freely available, felt no urge to develop machines, with one notable exception, that of war engines. These were true machines in which the makers had often to take measures to reduce the loss of energy through friction. A typical example was a battering ram constructed in 300 B. C. by a Greek engineer, Dodes. It was mounted on rollers held in a channel, and defenders of besieged cities doubtless had cause to fear its increased efficiency. It was an intelligent effort to overcome friction, work now successfully accomplished by ball bearings.

FRICTION yields to the accurate construction of Torrington Ball Bearings. By incorporating them in your production, a noteworthy addition is made to machine-life, and machine-efficiency.

Torringtons are successful exponents of the accepted theory that fine materials, made to exceedingly accurate dimensions, constitute the satisfactory ball bearing. Their smooth and frictionless operation is a revelation to users.

The Torrington Company
ESTABLISHED 1866
Torrington, Conn., U.S.A.

TORRINGTON TENSION NIPPLE SPOKES build wheels noted for beauty, uniform tension, strength and adjustability. Readers of the Saturday Evening Post are being told to "Look for the Nipple!"

DISTRICT SALES REPRESENTATIVES

S. W. ANDERSON
565 W. Washington Blvd.
Chicago, Ill.

The TORRINGTON COMPANY
Curtis Building
2842 W. Grand Boulevard
Detroit, Mich.

DUDLO

Nation-Wide Service

THE fact that Dudlo has become the nation's headquarters for coils and magnet wire has made necessary the organization of a vast, nation-wide service which stretches from Atlantic to Pacific.

Dudlo's modern factory facilities at Fort Wayne, Ind., have made possible production methods that are unparalleled, and Dudlo engineers, with their years of experience, will help you solve the most complex coil and wire problems which may be peculiar to your product.

DUDLO MANUFACTURING COMPANY
FORT WAYNE, INDIANA
Division of General Cable Corporation

LOVELL—ANOTHER UDYLITE CUSTOMER

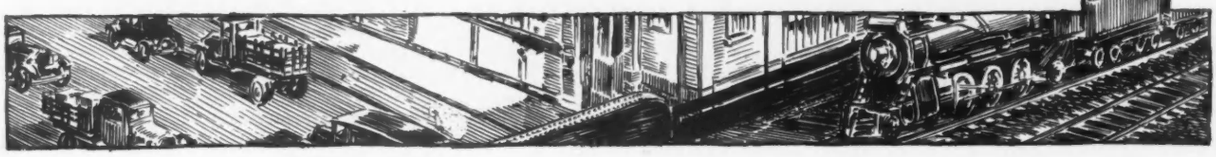
THE Lovell Manufacturing Company builds both power and hand-operated wringers and builds them well. Forty-two washing machines use the power wringer and thousands of housewives the hand-operated one. All the metal parts of these wringers are protected by the Udylite Process. It adds years of usefulness to this or any other exposed metal product. For the Udylite Process absolutely seals the iron and steel from rust and corrosion and imparts a rich silver-gloss to the protected metal

NOT A PRODUCT BUT A PROCESS

Udylite
RUST PROOFS
REG. U S PAT OFF

The UDYLITE PROCESS COMPANY

Eastern Sales Office: 30 East 42nd St., New York
3220 Bellevue Avenue DETROIT, MICH.
Western Sales Office: 114 Sansome St., San Francisco, Cal.



WANTED: Experts only to solve modern traffic problems

IN the leisurely horse and buggy days the only important traffic rule was: "Keep to the right." Today, "Keep Moving!" is paramount. Traffic, with its complexity and congestion, has grown so great that only men specially trained in that field can attempt to solve its difficult problems. Without expert direction hopeless tangles, accidents and business loss are bound to result.

For packaging problems only the PACKAGE ENGINEER

IN the old hammer and nails period the making of a shipping container was a simple matter. A wooden box of the required size and strength answered the purpose. Business was slower, labor and material costs lower, profit margins wider.

Today, keen competition, increased volume and greater transportation hazards demand a better shipping container at lower cost. Corrugated fibre shipping boxes meet this demand with their greater safety, convenience and economy.

Yet corrugated fibre boxes must be expertly designed to completely meet the individual user's requirements. Shape, shipping costs, packing room labor costs, storage limitations, merchandising requirements, strength, protection, display value —all these factors are considered by H&D Package Engineers

The staff of 50 has a combined experience of many centuries acquired in the study of thousands of diversified products. They have saved thousands of dollars for other shippers. Their services are at your disposal without charge or obligation.

Mail the coupon for a copy of the latest H&D booklet on scientific packaging in your field.

THE HINDE & DAUCH PAPER COMPANY
325 Decatur Street Sandusky, Ohio

HINDE & DAUCH *corrugated fibre* SHIPPING BOXES

H&D

THE HINDE & DAUCH PAPER CO., 325 Decatur St., Sandusky, Ohio
Please send a copy of "Package Engineering" to

Name .....

Address .....

Town .....

We are interested in packing .....

Craftsmen with thirty years of molding experience . . . and proud of their profession . . . zealously supervise the production of every part.

A complete BAKELITE *service*

manned by experts in the molding of custom-built parts

This request came from our own customers—to whom we are supplying genuine hard rubber parts. They asked us to install a complete molded BAKELITE service. That doesn't mean that we are prepared to supply you merely with Bakelite.

BAKELITE is but a substance, wonderfully useful, a real discovery. But BAKELITE can be useful to you ***only*** if it is ***molded expertly.***

It takes a staff that is experienced, intelligent, and skilled to give a complete BAKELITE service. With that in mind we have created facilities for serving you in this important field of plastics.

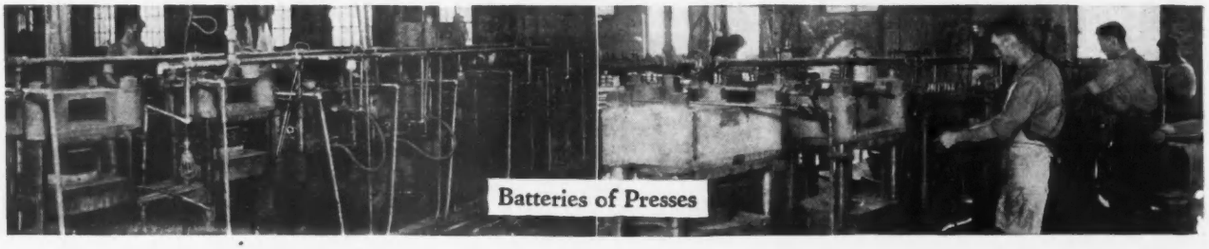
We guarantee that the highest standards of craftsmanship will be devoted to your work. This is the only basis on which you should buy BAKELITE parts.

Let us quote on your next requirements.

The VULCANIZED RUBBER COMPANY, *Inc.*

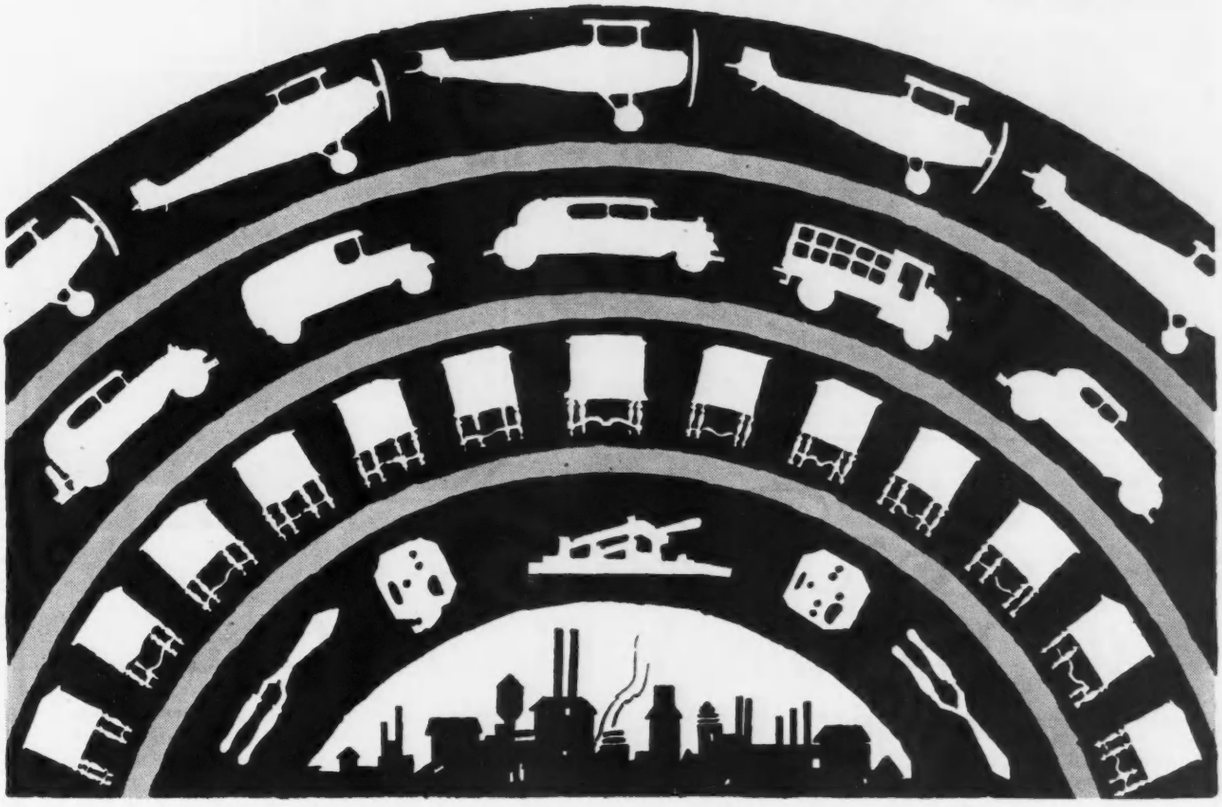
Makers of Genuine BAKELITE and HARD RUBBER PRODUCTS

251 FOURTH AVENUE **NEW YORK**



Batteries of Presses

LOCK IT WITH SHAKEPROOF



Type 20 Terminal

Type 12 Internal

Type 11 External

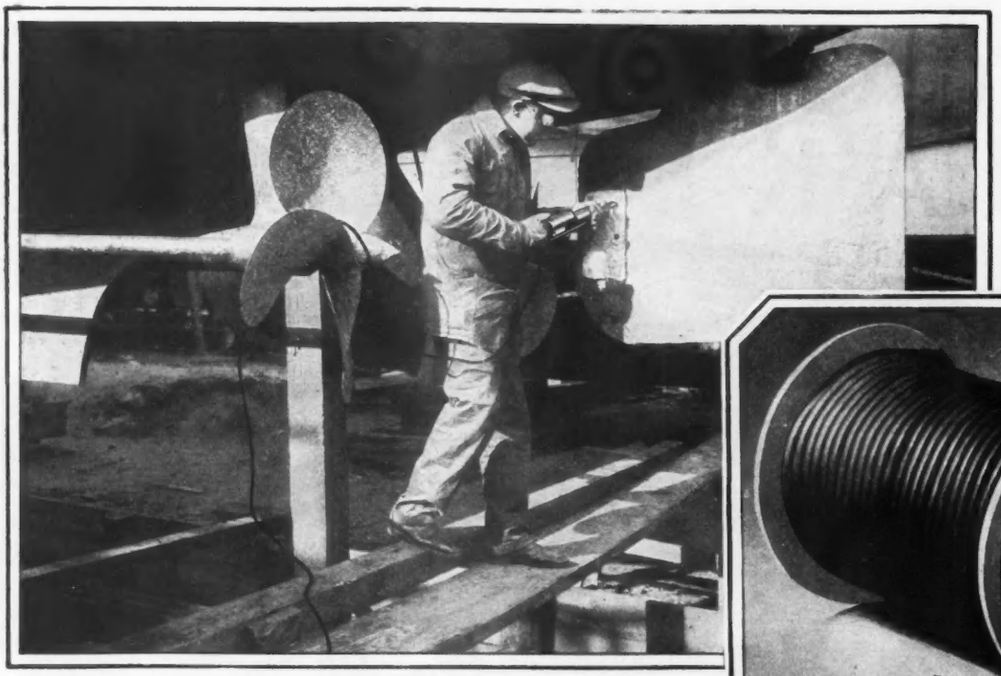
ON the modern line of production, whether it's airplanes or automobiles, radios or office appliances—no matter what the product, manufacturers are finding that SHAKEPROOF Lock Washers bring an easy, ready solution to all locking problems. SHAKEPROOF is the modern lock washer. Its twisted teeth bite in and won't let go, holding nuts firmly in a grip of steel. Easy to apply, SHAKEPROOF actually speeds up production, saving time and money. The list of SHAKEPROOF users is the Blue Book of American manufacturers.

Write today for free samples of SHAKEPROOF Lock Washers. Test them out in your own shop.

SHAKEPROOF LOCK WASHER COMPANY
(Division of Illinois Tool Works)
2513 North Keeler Avenue Chicago, Illinois

Twisted steel teeth set around the circumference of the washer bite in when the nut is tightened down—only applied pressure can loosen their tenacious hold.

SHAKEPROOF

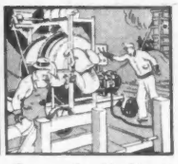


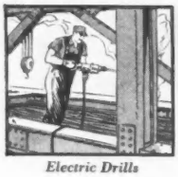
GE-Flex . . . . .

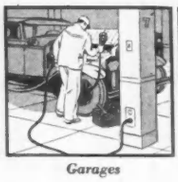
the *Dependable* Electric Cord

Lighting

Household Appliances


Construction Machinery


Electric Drills


Garages

Offices

Washing Machines

Vacuum Cleaners

Br-r-r-rung! Husky chatter. *All day long.* Never failing. *That's* how an electric hammer wins good will . . . and repeat orders . . . for its maker. Long-time dependability does it. *That's* why so many manufacturers equip their products with GE-Flex All-Rubber Cord—the power line of good electric tools.

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Electrical Manufacturing

Production - Marketing - Administration - Repairing

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When Mergers Become the Vogue and Why

MERGERS between electrical manufacturers are frequent nowadays. Is it just because the other fellow is doing it? Basically, no. There are many sounder reasons than that. And they afford numerous distinct advantages to both the electrical industry and the public in general, as is more clearly explained by the author in this article

By JOHN ALLEN MURPHY
Marketing Counsellor

THE epidemic of mergers that has been sweeping through the business world has not neglected the electrical industry. The electrical manufacturer has been infected by the consolidation virus just as have manufacturers in other fields.

Let us examine some of these electrical mergers and see what is back of them, find out what they are aiming at and what they are accomplishing. When the first merger epidemic hit the United States in the 90's, the electrical business was too young to catch it, a few cases developed, but as a whole the industry passed through that spell without many combinations resulting.

The same might be said of the 1900 to 1907 merger cycle. It was during that period that the eldest J. Pierpont Morgan took such an active part in bringing about many gigantic combinations. That was when the greatest and most successful of all mergers came into being—the United States Steel Corporation. It witnessed the rise of the American Can Company, the National Lead Company, the American Tobacco Company, and many others of like stature.

It was not until we reached the third merger epidemic, which started mildly in 1921 and reached ferocious intensity in 1928, that the electrical industry became heavily involved. Of course concerns, such as the General Electric Company, which have been engaged in a consistent expansion program almost from the very first day of their existence, have absorbed other enterprises at occasional

intervals. It should be understood, however, that while mergers, like influenza, appear in epidemic form periodically, there are always some consolidations taking place. Mergers reach the stage of a vogue during times of great industrial prosperity. The practice of forming combinations reaches a low ebb when business is dull.

¶ It should be understood that while mergers, like influenza, appear in epidemic form periodically, there are always some consolidations taking place

THE mergers of the 90's and of the early 1900's were essentially production mergers. That is a business increased its productive capacity through the process of consolidating competing plants. The present-day consolidation is often called a "distribution merger," but that term is hardly adequate. Probably the strongest influence behind the current merger movement is financial. The promotion of consolidations has become a big business. Some regard it as the country's main business at present. Certain it is that a stupendous amount of money is being made in the promotion of mergers. With the promoters' and the bankers' commissions on a single deal often running into the millions, it is no wonder that the country's ablest organizers are being rapidly drawn into the investment banking business.

Of course, we must concede that the merger promoters have found the times ripe for their efforts. Mergers offer a promising solution of many of the most perplexing problems of business. These problems are varied both in their complexions and in their complexities, but reduced to their fundamentals they are essentially problems that have been brought into existence by competition.

In the 90's, as I stated a few paragraphs back, mergers were used to build more manufacturing capacity quickly. Today they are being employed for just the opposite purpose—to utilize the excess plant capacity created by the war.

Not only did the war cause the erection of thousands of new factories, but it had another more far reaching effect on the output of manufactured goods. It stimulated machine production. In many fields the invention or the improvement of machines that supplant man power have increased production several hundred per cent over prewar levels. In some of these lines, machines are capable of turning out more goods in a few weeks than can be sold in a year. Consolidations are being organized in these industries with the idea of lessening the competition somewhat and thus reducing the superfluous producing power.

Another important reason for the current merger vogue is the necessity for establishing some sort of parity between manufacturing and retailing. Not so many years ago the average manufacturer was vastly bigger than the average retailer. At present the reverse of this comes pretty close to being true. With the growth of the chains, department stores and other large retailing units, the average specialty manufacturer is a pygmy compared with the retail organizations from whom he gets most of his business. There are a number of chains whose sales run well up into the hundreds of millions of dollars. The annual volume of one of them—that of the Great Atlantic & Pacific Tea Company approaches the billion dollar mark. The sales of a single store, R. H. Macy & Co., of New York, is in the neighborhood of $100,000,000 yearly.

Very few manufacturers can boast any such turnover. This places them at a terrible disadvantage in dealing with their large distributors. The manufacturers in a number of fields are actually at the mercy of the retail trade. So as to overcome this disadvantage, manufacturers are aiming, through consolidation, to get themselves on an approximate size level with their retailers. This is the chief purpose behind the General Foods, Standard Brands and several other large combines.

But probably the principal motive power behind the majority of present-day mergers, is the eagerness of management to build full lines. The day of the single specialty or the narrowly restricted line seems to have passed, temporarily at least. The best way to build a family of products quickly is to draw a number of specialty manufacturers into a combine.

This practice is in vogue in the electrical industry, as well as in scores of other fields. In fact it might be said to be the sole excuse for several electrical mergers. At any rate, it is the main excuse for them.

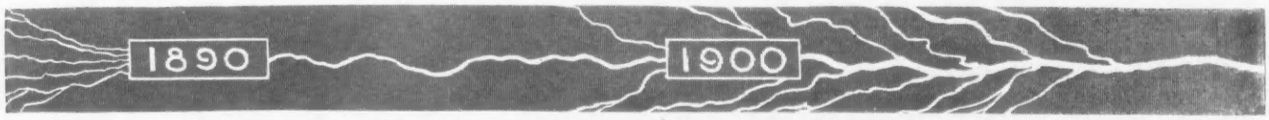
Almost every electrical product was started as a specialty. The inventor made his own device and marketed it often without establishing much of an identity with the electrical industry. He may have played pretty much of a lone hand for years. Unless his specialty grew to more than ordinary importance in the industry or unless he developed a full line, his business may never have attained much eminence.

However, from the very beginning of the electrical industry the tendency has been for the specialty to grow into a line or family. This accretion was accomplished either by consolidation with other companies or by the simple process of making additions to the family. Until recently the latter practice has been by far the most common. Some companies followed both plans.

¶ Probably the strongest influence behind the current merger movement is financial. The promotion of consolidation has come to be Big Business!

THE General Electric Company is undoubtedly the industry's largest and most ramified organization. The enterprise is now about forty-nine years old, if we are to date its beginnings from the start of the first company that was ultimately to enter the General Electric family. We are celebrating this year the fiftieth anniversary of the birth of the electric light. The arc light was invented three or four years earlier by Brush. Another pioneer of this period in electrical invention was Elihu Thomson. In 1880 Thomson organized the American Electric Company, which opened a shop for the manufacture in a small way of a number of electrical devices. The business was located at New Britain, Conn. This humble concern proved to be the forerunner of the great General Electric Company of today.

The business as founded at New Britain did not thrive. A group of shoe and leather manufacturers from Lynn, Mass., became interested in the infant industry. They purchased the New Britain concern in 1883, and moved it to Lynn. It was rechristened the Thomson-Houston Elec-



tric Company, as a tribute to Professor Thomson and his associate, E. J. Houston.

The Thomson-Houston Electric Company prospered. At first its line was confined largely to arc lamps and isolated lighting stations. By 1888, we find, the company making electric railway equipment. In a short time it is the dominating factor in this new field. It was at this juncture that the organization first began to go in for mergers. Several electrical concerns were absorbed, notably the Brush Electric Company of Cleveland. Thus were the inventions of these two great pioneers, Thomson and Brush, pooled in the one enterprise.

Most of this while, Thomas Edison was going ahead with the manufacture of his incandescent electric lighting. In 1882 on Pearl Street in New York City, he opened a central station. In this way was started our colossal central power station industry. The incandescent lamps leaped immeasurably ahead of the arc lamp in popular practicability, and it wasn't long before there were Edison lighting companies being started in scores of communities. Any number of equipment, lamps and other companies were organized to cater to the rapidly growing electric light business.

In 1889 a number of these various Edison companies were drawn together and the Edison General Electric Company was launched. The headquarters was placed at Schenectady, where the Edison Machine Works had been located for some time.

This left but two companies in dominant position in the young industry—the Edison General Electric Company and the Thomson-Houston Electric Company. While each of these two concerns owned vital patents and each company had its points of superiority, still in many respects they rendered a duplicating service. Certainly the two organizations were strongly competitive. A bitter patent fight was threatened.

¶ A merger must have years to "set" before one can determine whether it is a success or a failure. Many in the electrical industry justify themselves

FORTUNATELY, all this trouble was avoided by the merger of the two companies in 1892, under the name of the General Electric Company. Thus was centered in one organization the pioneering development work of half a dozen of the industry's great trail-blazers, such as Edison, Brush, Thomson, Wood, Sprague, Bently, Short, Van Depoele, etc. Charles A. Coffin was made president of the combine. He had been connected with the Thomson-Houston Electric Company from the very beginning and was long recognized as the industry's leading executive.

During the first year of the General Electric Company's existence, it did a business of about $1,000,000 a month. In 1928, its sales approximated $1,000,000 a day. This amazing increase is representative of the growth of the industry in thirty-five years. General Electric did no more than to take advantage of its opportunities and to move along with the industry.

Since the formation of the basic corporation in 1892, General Electric has done some consolidating, but by far the larger proportion of its growth is due to inside development—adding new products, bringing out new lines, entering allied fields. Perhaps the most significant merger that General Electric has entered since the original combine, took place in 1917, when the Edison Electric Appliance Company was organized. This concern represents a consolidation of the Hughes Electric Heating Company, the Hotpoint Electric Heating Company and the household heating appliance business of the General Electric Company. Up to this point General Electric had gained preeminence in engineering and in industrial lines. It was weak in the merchandising field. It reasoned that it could attain full stature overnight in at least a division of the appliance market by acquiring Hughes and Hotpoint.

¶ Considering those mergers in all lines of business that have been organized in the past forty years, about one-third of them are successful

THIS brief outline of the history of the General Electric Company furnishes us with a typical example of what consolidations and mergers can do for a progressive business. A company in a young industry has either to go forward or backward. It cannot stand still. It has to keep pace with the field of endeavor in which it has cast its lot. Perhaps no organization in any business has done a better job of keeping pace with the growth of its industry than has the General Electric Company. It has employed every conceivable method of development. But of all available methods of expansion, probably mergers have played the most conspicuous part.

Another expansion device that General Electric has successfully used is to turn over a part of its development work to an affiliated company. Of course, the plan of operating through subsidiaries is now extensively followed by Big Business. General Electric, however, has given its affiliations more independence than is usually the custom. For example, a reason often given for the immediate success of the General Electric electric refrigerator is that this division of the company was absolutely divorced from the rest of the business. To all intents and purposes, it has been run as an entirely independent concern and not as just another General Electric product.

Similarly, when radio became an actuality and every indication pointed to the fact that radio would soon become a real business, the General Electric Company, in common with the Westinghouse Electric & Mfg. Company, tossed its radio interests into another affiliation—the Radio Corporation of America. Radio promised to become too important an industry to be conducted as a branch to a general electrical business. It is fortunate that such a step was taken. Already the young business has grown so hugely that with its allied fields, it is almost as big as its parent. Radio could not have attained this size had it been left to flounder along as a tail to the electrical industry.

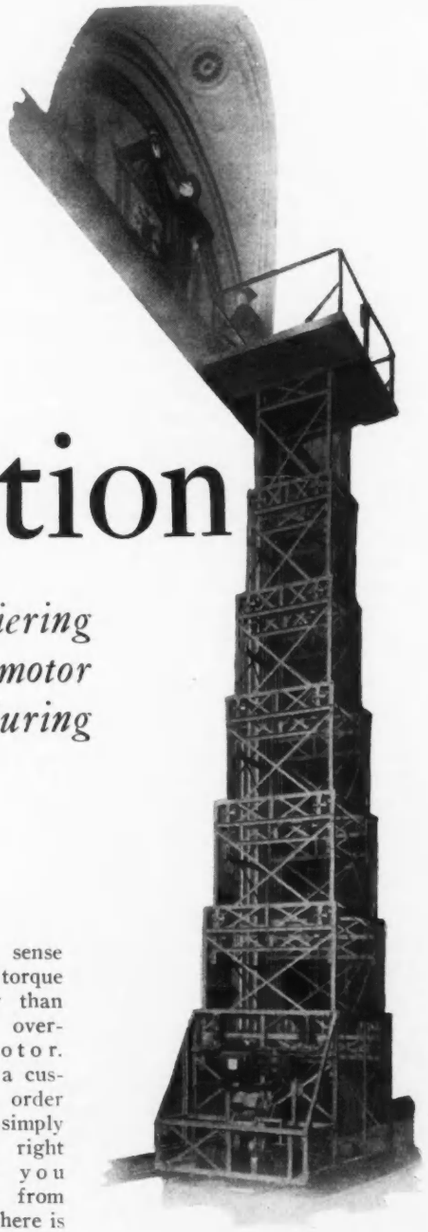
Just as General Electric is the most conspicuous consolidation that the electrical industry has known in its entire history, R. C. A. has been the industry's most active exponent of mergers during the last five years. I am not going to detail all of the deals that R. C. A. has consummated recently. Suffice it to interpret the policy that it is attempting to carry out.

The corporation is aiming to build a complete entity not only in the radio, but also in the larger field of public

(*Continued on page* 64)

We Design Our Product With a View to

Simplified Motor Selection



Fully extended, this motor-elevated telescoping platform puts topmost areas within easy reach

How a manufacturer of motor-driven tiering machines secures considerable leeway in motor selection by keeping this factor in mind during the design stage

By William B. Pavey
President, Economy Engineering Company

We are electrical manufacturers in the sense that we use electric motors—some 300 of them in the course of a year in sizes from one half hp. up to seven and one half hp.—as an essential part of our product. And, we naturally bear the motor rather closely in mind in designing our product.

Now it would be perfectly simple design room procedure to determine the desired motor characteristics and performance, then to select a single motor to meet these needs, and finally to design the product so that that particular motor may be snugly and trimly accommodated. But we don't proceed quite that way.

The electric motors which we use are special as to starting torque but not as to hp. or as to physical dimension. It introduces problem enough as it is with torque alone constituting the special feature, but we would have the added difficulty of dimension were it not that we definitely design against it.

Now let me go back and explain what I mean. We make a line of tiering machines which are in effect hoisting mechanisms. Thus obviously we are much concerned with the necessity for a high starting torque for our motor drives. This means that in this sense we must have special motors.

Now if we designed our equipment so that the drive from these motors were by gear, it is quite clear that we should have to have fixed centers between pinion shaft and motor shaft. This then would tie it down to a fixed physical dimension for the motor itself. An undesirable situation for reasons which I shall attempt to point out shortly. So we use silent chains for our motor drive.

While various sub-assemblies which go to make up our product are standard, much of our completed equipment is special. And, as I have said, all of our motors are special in the sense that the starting torque must be higher than the regulation over-the-counter motor. Now supposing a customer wants an order filled quickly — simply must have it right away. And, you doubtless know from experience that there is that kind of a customer and that there is that kind of a rush order. Further, it is our job as servants of industry to meet these conditions whenever and wherever they arise.

Motors are going to prove one rather major stumbling block to prevent an extra quick shipment. They are going to unless you have a very large investment in motor stock. And modern management says "No" to stocks that do not turn rapidly.

That is, motors are going to trip you up *if* you are tied down too closely as to requirements. But with chain drive, dimensions of motor space are not fixed and so in a pinch a two hp. motor may be placed where a single hp. motor would under more nearly normal conditions have sufficed. Or a motor of different make may be substituted.

In other words, this design policy of ours, so far as motors are concerned, enables us to move quickly if need be, it gives us more possibilities to draw from and we are not dependent upon a single source or particular size of motor.

From the point of view of our particular needs there are two broad classes of motors, which I like to refer to as "over-the-counter" motors and "special" motors.

By "over-the-counter" motors, I mean the great bulk of motors sold for such ordinary industrial uses as bolting to the ceiling for group drive work. Take a motor of this sort, say a three phase, 2 hp. unit. Applied to our work such a motor, after it gets started, will readily lift 1000 lbs. 30 ft. per min. and it will probably have ample overload capacity.

But applied to our product such a motor might be a failure. It might not lift over 500 lb. as it starts up. Now, as everybody who uses motors knows, you cannot "have your cake and eat it too." To get an unusually high starting torque you sacrifice an efficiency at regular running speed. However, with us, in common with all manufacturers of hoisting equipment, over-all efficiency is not so important, but starting torque is of primary consideration.

We had been buying our motors from one of the large manufacturers who specialize in these over-the-counter general purpose motors but as we continued to buy them we observed that the starting torque was falling off. We complained about it and there was some show of attempting to locate the trouble but finally the motor manufacturer admitted that the line of over-the-counter motors was being redesigned for greater over-all efficiency.

True, this was helping out the troubles of the average motor user and giving him a better motor for his needs, but not for ours. So when this redesign took place we were out of luck. In other words, this redesign gave the manufacturer a better "competition" motor.

The policy of this motor manufacturer was and is typical of others who do a volume business. I do not criticize it, but merely state it as a fact. So we now buy motors from the smaller manufacturer, who can meet our special needs, and meet them quickly.

And in the first half of that last sentence is the explanation of the second half. We could, of course, get the motor we need from the large manufacturer of motors too, but our experience has been that we have to wait from ten to twelve weeks, whereas from a smaller maker we can get motors in half as many days.

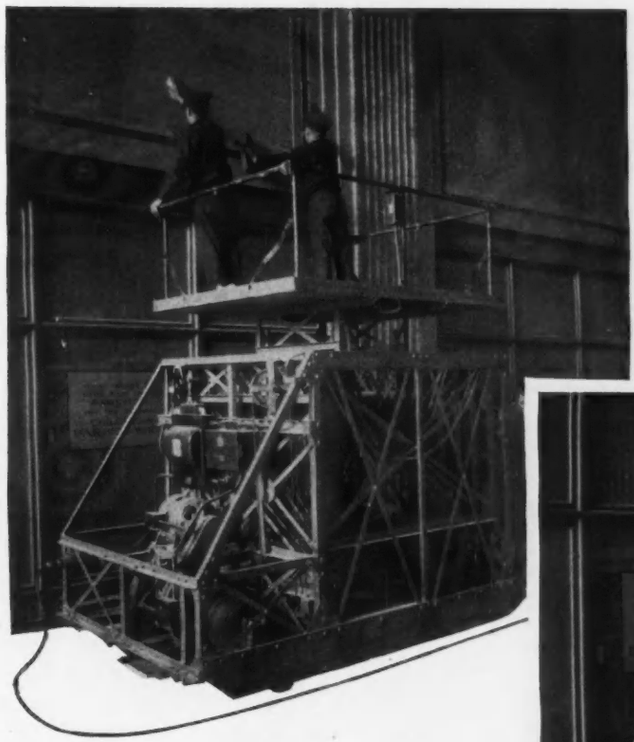
I don't want to give the impression that we wait for an order for one of our machines or for several of them before we place an order for motors. We carry a good stock of motors, but in line with modern management practice we try to keep this at a minimum by the simple rule of carrying nothing but motors with standard current characteristics. Odd currents, like 25 and 40 cycles, are handled by ordering the motor for the job, and here is where quick delivery from the motor manufacturer becomes important.

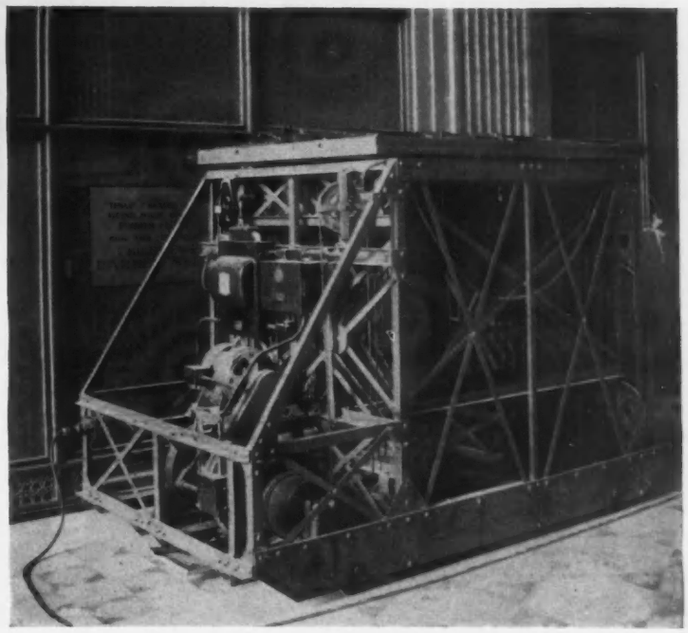
In buying motors we try to purchase from more than one source, to get the advantage of competition. Our suppliers of motors are always seeing competitive motors on test in our plant or out in service. This too, is in line with what we understand to be good current business practice. And further, as proof of the pudding, our motor costs have come down to lower levels.

It is rather difficult to discuss the purchase of an engineering product like motors without edging over toward that industrial management battle ground which has staged so many bouts between the purchasing agent and the engineering department.

The engineering department, generally speaking, knows nothing of the mystery of buying, and it is quite likely to forget that others besides one company are fully capable of supplying one's motor needs. If this point of view is allowed to prevail, costs are going to reflect it adversely.

On the other hand, there is always the trouble of the Purchasing Agent "shopping around." One point of view is as fatal as the other. One leads to a condition where the Purchasing Agent is really designing the equipment, and the other to a situation where the





EVERY four minutes a lamp burns out in the main corridor of the Fisher Building, Detroit, there are so many of them. To put these lamps within easy access, this motor-driven telescoping platform was designed. On the opposite page it is shown fully extended. Notice the push-button control conveniently located on the platform rail. So that the machine may be moved through doorways into the storeroom when not in use, even the platform railing folds over flat, as is evident in the illustration at the right

engineering department is doing all the motor buying. A give-and-take handling of the thing is required for best all round results.

While, in a sense, it is none of my business, I am tempted to add a word as to what I would do about this matter of special motors, if I were a motor manufacturer. I am tempted to do so because it has been pointed out to me that perhaps it really is my business in common with that of the many other buyers of special motors who constitute a considerable group of customers.

If I were a motor manufacturer, it seems to me that I would make special or over-the-counter motors. One or the other. I wouldn't try to straddle the two, for I don't believe it can be done effectively.

If I chose to go after the "counter" trade, I would, of course, seek large volume, and low price for a motor designed for high over-all efficiency. Nor would I claim for it special characteristics it could not reasonably be expected to possess. If, on the other hand, I decided to go after the specialist trade, I would strive for a reputation for meeting special requirements and for doing so reasonably quickly.

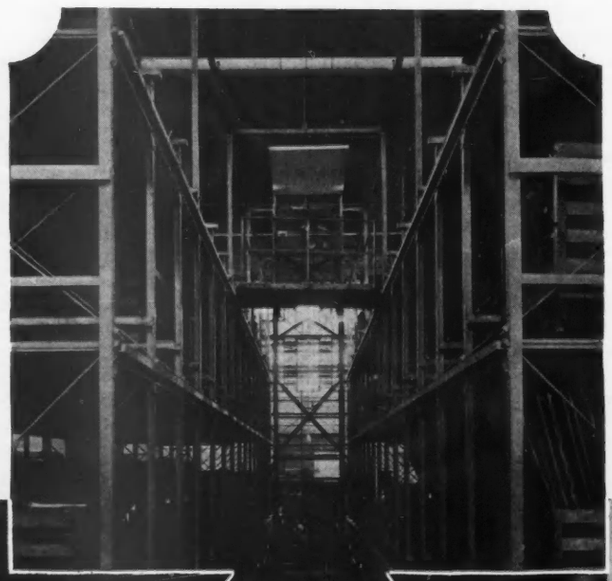
It probably follows naturally that some of the excellent special motor manufacturers are the smaller manufacturers, because special motors are inherently not a volume line, and it is also true that being small, they do not have the inherent inertia of the very large companies. Thus they can quickly adjust themselves to sudden demands, which probably accounts for the fact that we can get motors from such people in five or six days instead of ten or twelve weeks.

Truly the small manufacturer has so many inherent advantages that I never fear for his existence even in the face of the present wave of mergers and consolidations. The chief stock in trade of such companies is service to customer and by their small size they are often peculiarly endowed to give it to a high degree. At least that is the impression gained of motor manufacturers by me, one of their customers.

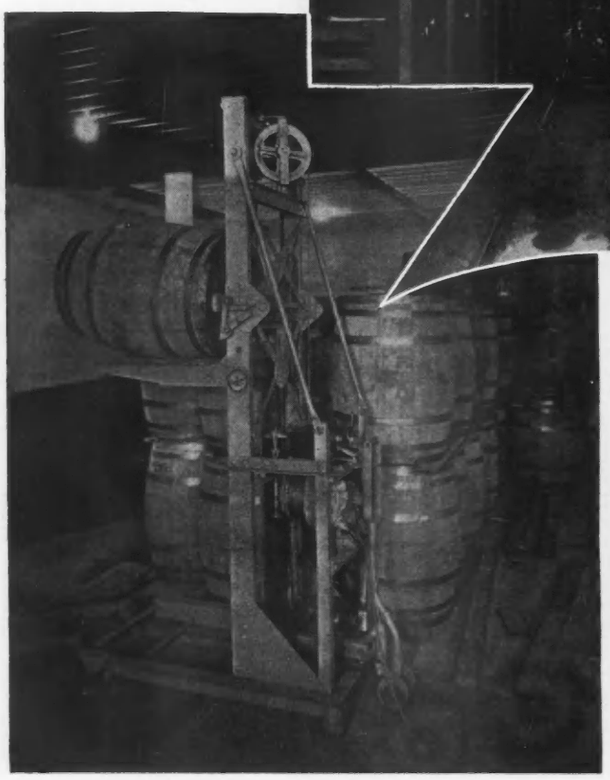
And that leads me to fire a blank shot of warning or of salute rather than a solid destructive charge at the business magazine editors, for one of which I am writing this article.

Just as the little fellow in the motor manufacturing field is important to the motor customer, so is the small manufacturer filling a worthwhile niche throughout the electrical industry. This is not a disinterested statement for my own company I count as among the small concerns. But the point is that I feel that articles in the business press are too often written for the big fellow.

This self-propelled, motor-operated tiering machine loads trucks of mattresses for the Pullman Company. Push-buttons control both vertical and horizontal travel



A ½-hp. reversing motor drives this tiering machine on both up and down travel



Both lifted and tilted by power. Note the chain-connected motor mentioned in the text

Selling the Company plus its Electrical Product

How one electrical manufacturer has approached the problem. His unique solution contains much of value to others who face similar situations

Introducing Mr. Young

An Interview with

H. W. YOUNG

President, Delta-Star Electric Company

By LEON I. THOMAS

Managing Editor, ELECTRICAL MANUFACTURING

"IF I weren't an electrical manufacturer I think I should like to be a publisher," Mr. Young told me at the very outset of our talk. And long before our two-hour chat was over I was willing to admit to myself that he would make a darn good one, too.

Because it developed soon that he is no mean editor, even to talking the editorial lingo, I found myself quite at home with him in a moment. But that is getting somewhat ahead of the story.

I suppose it is a case of lugging the well known coals to Newcastle to attempt to tell the readers of ELECTRICAL MANUFACTURING what the business of the Delta-Star Electric Company is. But to make the record complete let me say that it is the manufacture of high voltage switching and outdoor substation equipment.

A little inquiry developed the fact that his problem is not only that of making equipment but also in meeting highly competitive conditions in a field being contested for by both small and large manufacturing companies.

At this point I felt a little less hesitant about asking him a question I had had on my mind.

It was this: Why is it that you can stay in business alongside of the huge electrical companies? He fired back at me, "I daresay you do not always patronize the nearest barber to your office. Why not? Why do you go out of your way to get your hair cut where you do?" The answer was obvious—personal service, an intimate knowledge of my needs.

Then his figure of speech shifted to the medical field. "The big companies," he said, "are the general practitioners while this company is among the specialists of the industry." Again he chose a new figure: "There are those who sell excellent readymade clothes, and then there are custom tailors. We are 'high tension custom tailors.'"

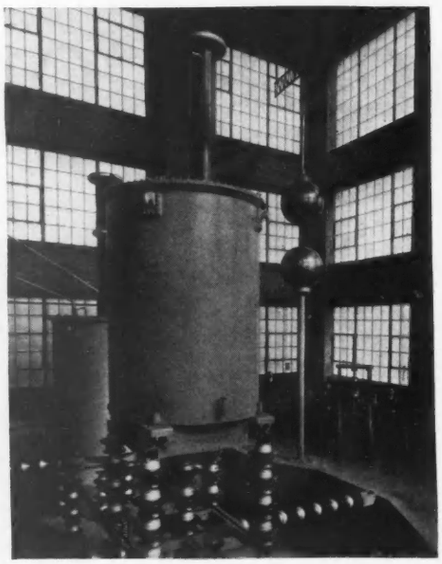
All this may be so, but prospective customers must be made to appreciate the fact before it does Delta-Star any good. And this leads me to quote a remark of his as we traveled around the factory. Pointing to a framed picture of a group meeting of employees, he said, "There are no 'verbotens' in this plant. When we have some instructions to give, or some project to get across we don't issue 'Thou shalt,' or 'Thou shalt not' written orders. Rather, we call all the people involved together and we tell 'em."

And that's just what he does with prospective customers. He tells 'em. And he tells 'em often. They can't help knowing what it's all about for he tells them in advertisements in the papers of the industry and also tells them through a house organ—but Young insists that it is a "mouth organ"—which has many unique features. But more about that later.

Between direct-by-mail and business paper advertising he tries to maintain what he calls a balanced diet. But with this double attack he doesn't even try to get all the business there is. Nor is there ever any tearing down efforts at business getting. This is strictly taboo.

Perhaps you will recall that much of the copy is signed with Young's signature and with him this is no idle gesture. It doesn't mean that he has delegated someone to write it and then left instructions to get out the zinc etching of his signature and run it underneath to give a borrowed semblance of the personal touch. Not at all. This signature means exactly the same thing in his copy that it does at the end of a letter. It indicates that he wrote it and means it.

But not all the copy in his house organ is signed. If it were, every page would bear his signature. He even "pastes up" the dummy which goes to the printer. Why? You wouldn't ask if you had listened to him talking editorial policies, the value of this or that type of heading, editorial "tie-ins," how to "snap up" a story, getting the right kind of illustration and so on. He would have a hard time indeed hiring anybody who could do the job as well as he can—and if he did it would not be Young talking to his readers as it is now.



Selling the testing facilities is selling the product. Here are available 750,000 *volts and* 30,000 *amperes. Fifty-thousand-pound testing machines are also at hand*

I have seen many a successful editor who knew less about editing than Young does!

Where did he get his training in this direction? I don't know; I guess he was born that way. At least in his modesty he would admit of only incidental duties that called for any writing on any jobs that he held before he went into business for himself.

The advertising of Delta-Star in the business papers of the industry began as 1/16 pages. "That was all we could afford at the time," Young told me. But of course this was increased as soon as financial opportunity allowed.

At first the copy, by the very nature of things, had to be directed to the product itself. This was the case for about ten years. Then with the product established and well known, the copy was changed to stress the institution. So that Young seldom talks product direct in his advertising copy.

It struck me as an interesting thing and yet is typical of a situation frequently faced by some electrical manufacturers, that a few years ago he found that he had advertised the institution so well that some prospective customers got the idea that Delta-Star was the Rolls-Royce of the industry, not only as to quality but as to price as well.

"If I were to become critical I would say that the average electrical manufacturer banks too much on the past. After all, the past is more nearly worthless than he thinks. What he wants to know, or should want to know, is where he is going tomorrow."

So then he had to start "advertising down," as he expresses it, to correct this price misimpression.

Feeling the need of a balanced advertising diet, as has already been explained, five years ago he started a house organ *The Delta Star*. The "masthead" proclaims it to be a "monthly message of common and uncommon sense" and interestingly states that the "subscription price is merely sending your name and address."

It started as a four-page sheet. A recent issue, which is before me, contains twelve pages of easy-to-read, well illustrated stuff. Many a house organ editor in the electrical field could learn a lot at Mr. Young's shoulder.

"You've got to make the stuff timely and it must stand out," he says, "No retoucher gets his hands on the photographs of factory operations and equipment installations that go into the magazine. Half the value of a camera is that it is a faithful reporter. Doctor the photograph of an installation and it is perfectly evident to the reader. Furthermore, if you gild the lily when it comes to photographs how does the reader know but what your copy that goes with it is doctored too? A photograph tells a true story, so let it stand, is the rule in *Delta Star*."

And here's something else out of Mr. Young's policies for the notebook of the electrical manufacturer who publishes a house organ, "*The Saturday Evening Post* has nothing on us when it comes to regularity and promptness of issuance. Some house organ editors even boast of their irregularity by putting on their masthead the phrase, 'Issued every now and then.'

"Not so with us. I believe that much of the value in the sheet is its regularity of appearance not only from the printer but on the recipient's desk. We even go so far as to schedule the mailings by zones so that practically every reader from coast to coast gets his copy at the same time.

"Nor do we come out at the first of the month when there is so much other mail to claim the recipient's attention. So we issue on the 15th of each month.

"Our circulation is now almost an even 20,000. Nor is it a forced circulation. How do we know? I'll tell you. A while ago we enclosed return post cards with an issue, asking for definite signed request to continue sending the publication if it was wanted. At that time the circulation was 17,300 and 15,283 men asked to be kept on the list. Less than 500 wanted it stopped." Many and many a house organ editor would be glad to report such results to his boss.

My face may have worn a skeptical look. At any rate, Mr. Young reached for a folder and drew from it some correspondence with a high executive of a nationally known engineering concern. This man wanted to know why he was not getting the publication any more and asked for a copy of a certain issue. Young's reply was that the issue asked for was being sent and that he would get back on the list "when and if" he mailed back, with his personal signature, the enclosed request card.

More often than not the railroad train is the editorial office. "I write the stuff in longhand and send it back where it is deciphered and is ready to work up into page form when I get back," said Mr. Young. "It doesn't take much time to write the copy," he insists, "anymore than it does to do any job you like to do."

While everything is tied in with the product, the emphasis is generally elsewhere in the copy that goes into this publication. Nor does he stick to current happenings for material but delves into history and does such a good job of it that men write in for extra copies for their boys who are struggling with their too often, dry history books.

For instance there was the well pictured series of "Go-

Getters in History." One of the issues before me is illustrated by a reproduction of a famous painting of Nelson's victory at Trafalgar. After reading the story, you find this tie-in, "Anticipation is a necessary attribute in both civil and military success . . . Electric utility companies with carefully planned policies of constructive service, can subject themselves to much unfavorable criticism as the result of needless service outages. "Go-Getters" among utilities reduce the possibilities for such interruptions by adopting tested and proved equipment. Delta-Star anticipates the performance, etc., etc., etc. Here then is the perfect tie-in, not forced, but entirely natural. That is the reason it is quoted here, for such a tie-in is important whatever electrical manufacturer is applying the house organ plan.

Mr. Young insists that the so-called "house organ" should really be a "mouth organ." Some of his principles in this regard, and how he applies them should interest other electrical manufacturers who use this method of selling both product and company.

"Famous Guessers in History" was the title of another series and a new series is entitled, "Things That Endure." These are equally complete in themselves and yet tied back to the product by an ingenious hook at the end. The individual items in each of these series provide excellent copy for business paper advertising as well.

There is a good deal of humor tucked away in some of the items he runs, or in the headings he puts on them. So this led me to put this observation and question. "You hear it said that the engineer is a serious-minded animal, that he doesn't respond to the same things that a sales manager does, for example. Have you given this any thought in editing your publication?"

"Yes," he said, "we have had that reaction. One engineer phrased it in a letter to me, 'I don't like the humorous side in some of your advertising copy and would prefer reading straight engineering talks.' But to my way of thinking, engineers are just as human as non-engineers, so I try to make my stuff relaxing and not formidable. I am glad you brought up that point, for it reminds me to speak of the element of appearance in a product.

"Many a manufacturer of electrical equipment has the idea that those who buy products of that character are interested only in their engineering features. This is not so according to our experience. Look at color and style even in kitchens today. This is having its effect on engineers as well as on others so that appearance is beginning to count in no small way.

"Take the old-style wood pole outdoor sub-station. This was but a makeshift which served well during the development period. But today, the public wants the money it pays for service and securities invested in permanent improvements and extensions. Outdoor sub-stations are something about which the public forms an opinion of the public utility, and that opinion is largely a matter of impression.

"But before I leave the subject of house organs, I want to say that it seems to me the choice of a name for a publication or for a company itself is important. In our own case there is a little history I frequently like to recall.

"Our first business venture bore the firm name Electrical Manufacturing Company. It just didn't mean a thing. One night, when we were working evenings, I was at dinner with my business associate. He had heard me dictating a letter during the day about delta and star connections for transformers and asked me to explain it to him. I drew out the conventional delta and star diagram on the table cloth, and then as we went on talking idly drew a circle around it as one will make fancy figures on a desk pad while telephoning. After finishing my explanation I chanced to glance down at my pencil marks and it flashed over me that here was what seemed to me to be an excellent trade-mark. At any rate we seized upon it and that's how we came to have the trade-mark which we do."

Research is very close to Mr. Young's heart and he did not let me get way without showing me the splendid 750,000 volt, 30,000 ampere testing laboratory and telling not only of Delta-Star's large expenditures in research but of his working the subject into his advertising both in the business papers of the industry and in his own publication.

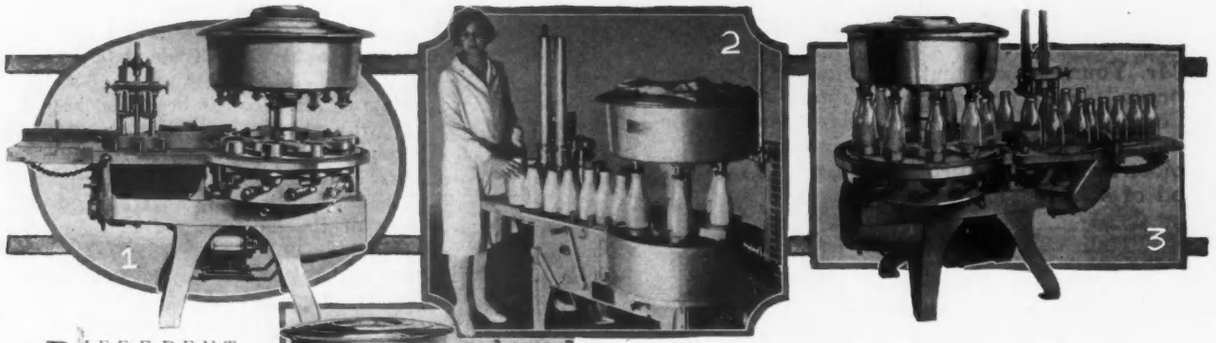
"Experimenting used to be done," he says, "at the customer's expense. But that time has passed. The owners of public utilities cannot nowadays allow their systems to be used as experimental stations. The manufacturer must build his own proving ground.

"And the value of a proving ground is just as great to the electrical manufacturer as it is to the automobile manufacturer where the idea, as everyone knows, has been developed to a high degree. You simply cannot afford to take the risk of marketing electrical apparatus not based upon sound research. That is why we consider engineering and research as the nerve center of our business.

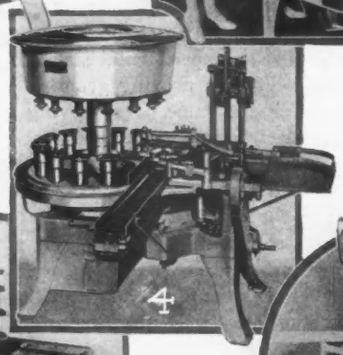
"If I were to become critical I would say that the average electrical manufacturer banks too much on the past. After all, the past is more nearly worthless than he thinks. What he wants to know, or should want to know, is where he is going tomorrow."

Notice in the illustrations the tie-in between ancient history and present-day electrical equipment. And in the text, too, is the same logical blending of past and present. This is one of a very successful series in Mr. Young's house organ

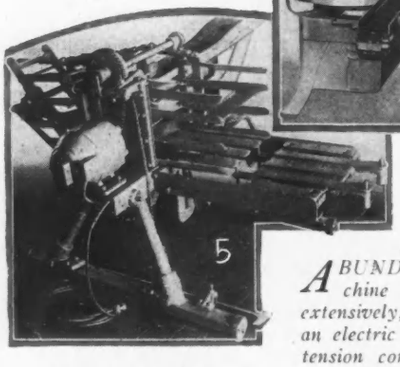
Here is a Market for

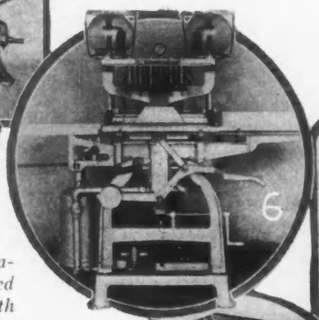


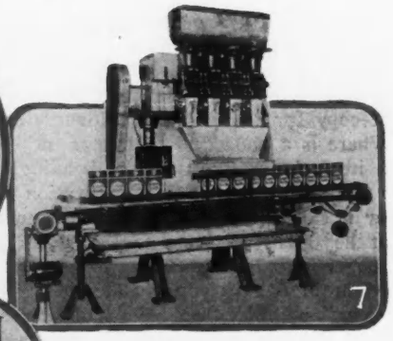
DIFFERENT types of motor driven bottle filling and capping machines are shown at (1) to (4), each fitted with a ½-hp. motor



A PORTABLE motor driven boxing machine driven by a ⅓-hp. motor is shown at (5). Notice that it has an attachment cord but no control. (6) Is a fully automatic filling machine, used on liquid products only, fitted with a motor and the necessary control apparatus for its regulation

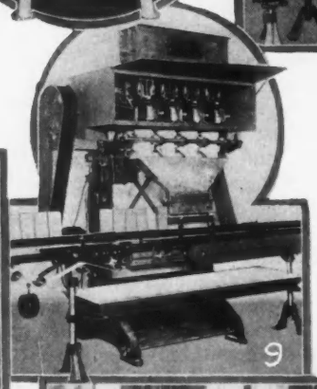






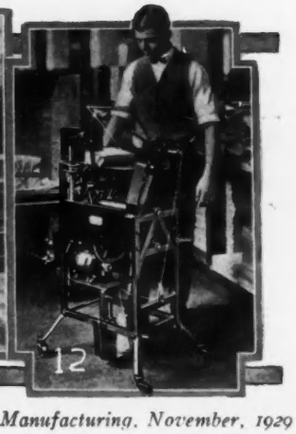
A BUNDLE tying machine that is used extensively, fitted with an electric motor, an extension cord and switch is shown at (8)

ANOTHER type of bundle tying machine that has the motor mounted as a unit under the operating mechanism of the machine is shown at (10). It is of the universal type, and power is supplied through a heavy rubber insulated cord, fitted with an attachment plug

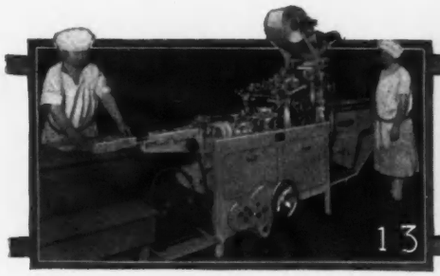


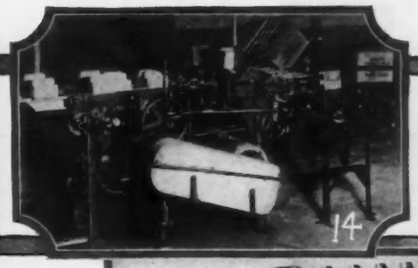
THE larger types of automatically operated weighing and filling machines that are used for dry products are shown at (7) and (9). Notice that they are operated by two motors, driving the various parts of their mechanism by means of belts. An inclosed type of control apparatus is mounted on the column near the center of each machine

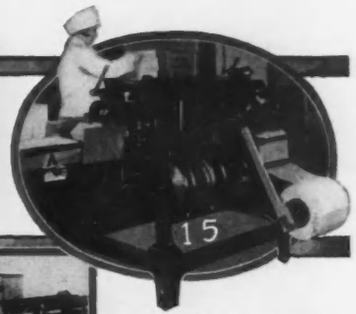
SOME additional illustrations of bundle tying machines that are motor driven are shown at (11) and (12). Each is fitted with attachment cords, plugs and a switch. Such machines as these will tie from 20 to 30 bundles a minute



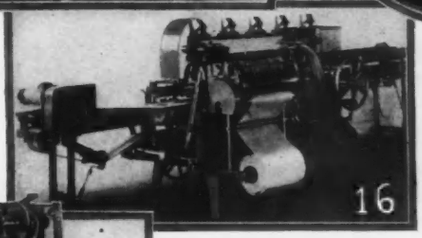
Electrical Equipment





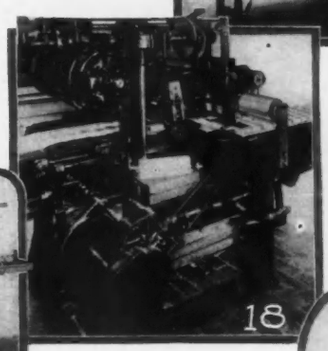


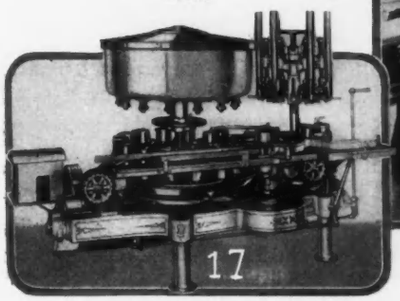
THE meat packing industry uses such machines as (13) *for packing and wrapping butter and other similar products. Notice that the motor is mounted as an integral part of the machine, that conduit for the wiring and a switch are used*



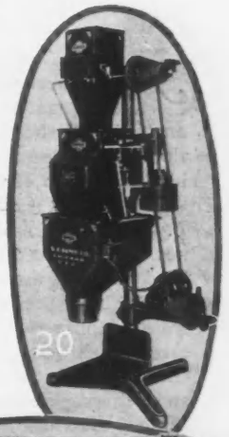
THIS is still another type of packaging machine that is motor driven, as it is used for wrapping sausage in a packing plant (15). *It is fitted with remote control*

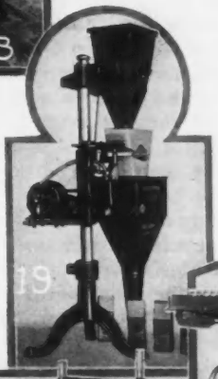
ANOTHER type of packaging machine used in the meat packing industry for wrapping lard is shown at (14). *It is motor driven and has control apparatus*



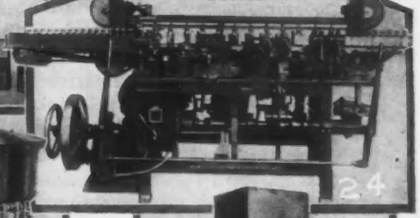


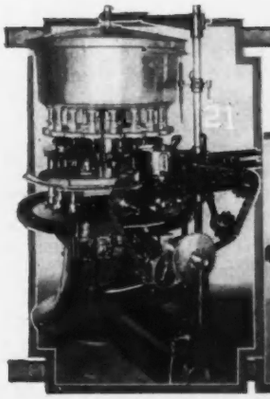
A RATHER complicated device that is employed for wrapping bacon in a packing plant (16). *Like the other machines shown on these pages, it is driven by an electric motor that must have some kind of control*

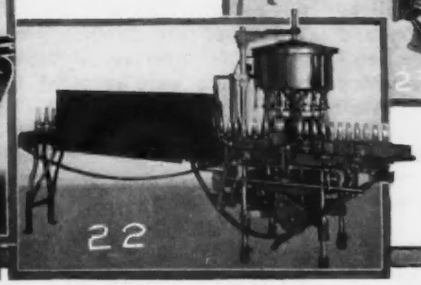


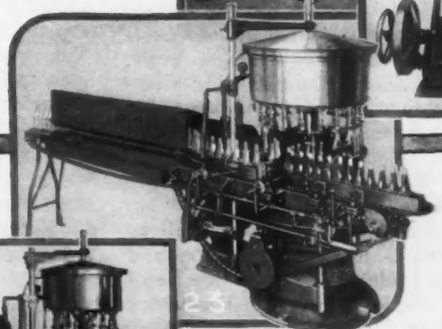


THIS is a motor driven bottling and capping machine using chains instead of belts for the various drives (17). (18) *is a motor driven machine used for cartoning bacon.* (19) *A non-free flowing weighing and packaging machine that is fitted with a motor and control.* (20) *is a machine similar to that shown in* (19), *except that it has a different type of drive.* (21) *A can filling and seaming machine that uses a 5 hp. motor for the seamer and a ½-hp. motor for the operating mechanism.* (22) *A bottling machine powered by a ½-hp. motor that will fill* 140 *containers a minute.* (23) *Another bottle filler that is driven by a ½-hp. motor*

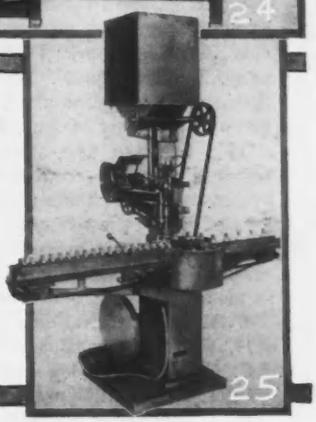








TWO bottle filling machines having both motor and controls as shown at (24) *and* (25)



NEMA

What Was Done

Clarence L. Collens
The New President

NEW officers and governors were elected, a new managing director was appointed and six trade practice conferences were held under the auspices of the Federal Trade Commission during the third annual meeting of NEMA at Washington, D. C., October seventh to eleventh inclusive.

Clarence L. Collens was elected to succeed Huntington B. Crouse as president of the association. Mr. Collens has now served the electrical manufacturing industry as the head of every association of which he has been a member, having been president of the Electric Power Club, Electrical Manufacturers Council, and the Electrical Manufacturers Club. Mr. Collens has also been awarded the McGraw Award for his part in the organization of NEMA and bringing about a satisfactory compromise in the 40-50 degree controversy among the electric motor manufacturers. He has been a governor of NEMA and vice-president of the Policies Division since the inception of NEMA and was acting president during the absence from the country of Mr. Crouse this summer.

R. H. Goodwillie was reelected treasurer. The following were elected vice-presidents: S. L. Nicholson, Westinghouse Electric & Manufacturing Company, New York, Charles H. Strawbridge, Goodman Manufacturing Company, Chicago; W. E. Sprackling, Anaconda Wire & Cable Company, New York; D. R. Bullen, General Electric Company, Schenectady, N. Y.; Louis B. F. Raycroft, Electric Storage Battery Company, Philadelphia. The names are given in the order of seniority, which was determined by lot.

This was the first annual meeting held in the fall as required by the recent changes in the constitution and by-laws. These changes also made provision for the members of the Section Council to select nine of their members to the Board of Governors for a term of one year. This resulted in the selection of the following section chairmen as members of the Board of Governors for this fiscal year:

I. A. Bennett, National Electric Products Corp.
H. T. Bussmann, Bussmann Mfg. Company.
P. G. Duryea, Cook Pottery Company.
C. A. Kurz, Jr., Kurz-Kasch Company.
H. J. Mauger, Edison Electric Appliance Co., Inc.
Arthur Miller, Miller Company, Ivanhoe Division.
D. H. Murphy, Wiremold Company.
C. L. Nicholson, 2nd, Pass & Seymour, Inc.
J. P. Wright, Continental Diamond Fibre Co.

As the new constitution reduces the number of governors to be elected by and from the Policies Division from 32 to 21, all the members of the old Board of Governors resigned, and the nominating committee was requested to nominate 21 governors, 7 for a term of 1 year, 7 for 2 years and 7 for 3 years. This was done and the nominees were unanimously elected as follows:

Term Expires 1930

Louis Allis, D. R. Bullen, R. H. Goodwillie, George W. Mason, F. A. Merrick, Louis B. F. Raycroft, J. H. Trumbull.

Term Expires 1931

H. B. Crouse, Otto H. Falk, W. L. Jacoby, J. F. Kerlin, S. L. Nicholson, R J Russell, Fay Woodmansee.

Term Expires 1932

C. L. Collens, H. T. Dyett, R. Edwards, F. R. Fishback, W. E. Sprackling, C. H. Srawbridge, Gerard Swope.

A. W. Berresford, president of the American Engineering Council, past president of the Associated Manufacturers of Electrical Supplies, Electrical Manufacturers Club, and the American Institute of Electrical Engineers, was appointed managing director of NEMA, effective at once to succeed Alfred E. Waller resigned. Mr. Berresford was formerly vice-president and general manager of the Cutler-Hammer Mfg. Co. and vice-president of what is now the Kelvinator Corporation.

After accepting Mr. Waller's resignation resolutions of appreciation for what he had accomplished with NEMA were adopted and ordered spread on the minutes by the board.

Trade Practice Conferences Tried Out

EVER since trade practice conferences were inaugurated by the Federal Trade Commission, NEMA sections have been interested in their possibility as an instrument for the correction of unfair trade practices. Nine sections decided to try out the plan and six of them, namely, Molded Insulation, Carbon, Outlet Box and Conduit Fittings, Manufactured Electrical Mica, Flexible Cord and Vulcanized Fibre, officially went before the commission, with their problems, in Washington. These trade practice conferences were provided for by Edgar A. McCullach, chairman of the commission, who was constructive in the advice he gave the sections to help them make their rules conform with the ideas of the commission. Many members from other sections attended the conferences in order to find out just how they were conducted, and to get a better idea as to what could be accomplished through this agency.

The audience included F. E. Neagle, counsel for NEMA

Fall Meeting at Washington

A. W. Berresford
The New Managing Director

and C. L. Collens, who explained the intent of their rules to the commissioner.

Each section holding a trade practice conference proposed and discussed and passed for approval by the commission a set of rules governing trade practices for its particular branch of the industry. Commissioner McCullough explained that the rules of such conferences fall into two classes:

First, those covered by law and court decisions based on the Sherman and Clayton acts.

Second, those that appear reasonable by interpretation of law and good business practice, but which have merely contractual legal standing as an agreement between an industry group and the Federal Trade Commission.

It is expected that the full Federal Trade Commission will take action later on the rules passed by the NEMA trade practice conferences and it is probable that some of the rules as agreed upon in conference will be changed by the commission or disallowed or omitted by that body.

A typical group of rules discussed and approved in these NEMA trade practice conferences covers the following subjects:

(1) Inducing breach of contract, (2) misbranding, (3) fraud and misrepresentation, (4) secret rebates, (5) costs, selling goods below own cost, (6) adherence to published prices, (7) enticement of employees by competitors, (8) defamation of or disparagement of a competitor's goods, (9) uniform contracts, (10) publicity of current prices, (11) piracy of styles, (12) definition of cost, (13) arbitration, and (14) violation of rules.

Tariffs and Credits Are Discussed

IN his last presidential address to the association H. B. Crouse reviewed the strides which NEMA has taken not only in its service to members, but in its standing among the associations of the industry during its relatively short life. He thanked the members for supporting the board's recommendations for the increased dues for the current fiscal year. For the immediate future, he said: "We must, of course, consolidate and nail down what we have accomplished and that means lots of hard work and eternal vigilance. The elimination of sub-standard material is a matter to which we must give the best that is in us. Another matter is the enlargement of our markets, and the last thing is the correcting of unsound commercial practices. The meeting scheduled for this week here, when many of our Sections have conferences with the Federal Trade Commission, is an outstanding achievement for NEMA."

W. E. Sprackling emphasized and enlarged on what Mr. Crouse had said for the development of larger markets. He sketched briefly the plan of the Electrical Industry Sales Conference and urged the cooperation of all members when the plan is made operative.

W. W. Freeman, president of The Society for Electrical Development, recommended the accomplishment of The Society for Electrical Development in terms of service to the manufacturers in the development of adequate wiring, the work on the uniform ordinance and in the development of the local electrical leagues.

Thomas Allen told the members of the difficulties which had been encountered by the tariff committee in carrying out the wishes of the different sections of NEMA in connection with the new tariff law now before Congress. The work of the committee resulted in electrical machinery and apparatus being taken out of the catch-all clause and listed as a separate item with a 40 per cent duty the same as it has previously. All the work of the committee was nullified by the Senate Ways and Means Committee, which recommended a 30 per cent duty. The NEMA tariff committee is watching the situation closely and all members were asked to be ready to cooperate with the committee on short notice if called upon.

At the executive session of the Policy Division on Wednesday evening, E. H. Shepard of the Graybar Electric Company gave some definite information on the various credit plans which had been attempted in different parts of the country, and showed their effect on business of both jobbers and manufacturers. Different phases of a related subject were given by S. L. Nicholson, who pointed out some of the attempts which are being made to limit the distribution of members' products, and outlined what NEMA is doing to try and insure free distribution. Mr. Nicholson and his committee were thanked for their efforts in behalf of NEMA and they were assured of backing of the membership.

C. P. Berolzheimer covered various aspects of the quality improvement of electrical products. This is a subject which is of vital interest to many NEMA sections.

At the meeting of the Section Council, composed of chairmen of sections and divisions, Marshall T. Jones, chief of the Electrical Equipment Division of the Department of Commerce, gave a detailed presentation of the facilities of his department available to the various sections of NEMA. He said that if the members of any section would give him some idea of their problems, especially in connection with foreign and domestic trade, that he would tell them specifically just how he could help them.

Spray Finishing Fundamentals

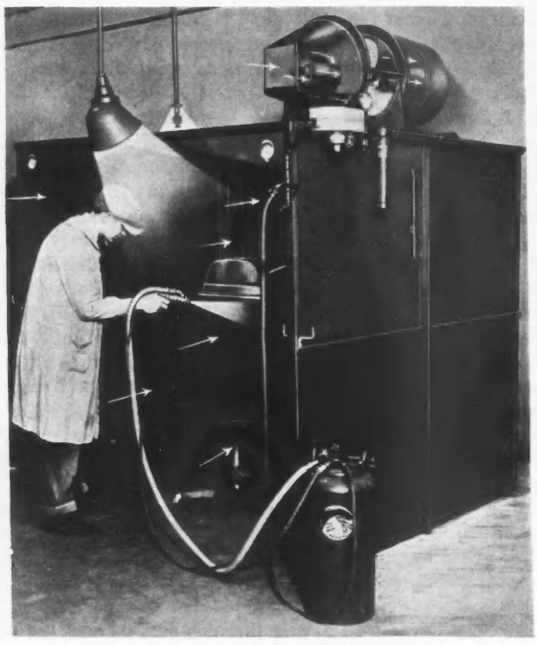
By
PAUL W. COLLINS

In concluding this series of articles, the author takes up the discussion of finishing methods and then describes how to eliminate fire hazards

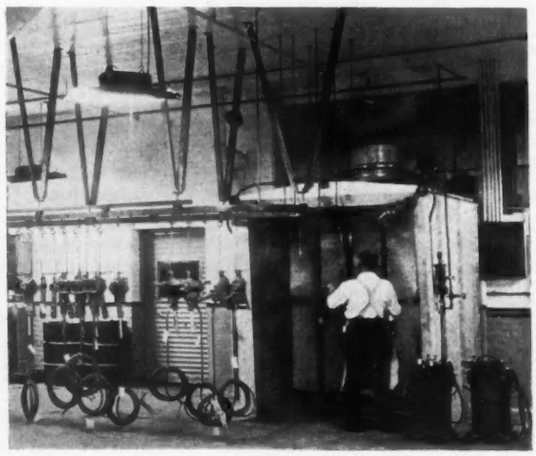
IN previous installments of this series of articles dealing with spray painting methods, equipment and materials the author explained the best practices in finishing different surfaces and now concludes with a continuation of this explanation and at the same time points out what should be done to eliminate fire hazards when spray finishing lacquers are used.

Sanding—The sanding operation is frequently given the least care and really deserves the most attention. The surfacer is the first coat to be sanded. The sanding should be done carefully and evenly; not working in one spot too long nor with a circular or rotating motion. On smooth flat surfaces, one can use mechanical sanding machines. Some of these are air operated, others motor driven, and still others by make-and-break electrical contact. On round, curved and irregular surfaces, the hand is the best type of "sanding block" obtainable.

The surfacer coats should be sanded to a smooth thin coat sufficiently thick to form an absorbative cushion for the finishing coats but not so thick as to "split" nor crack and chip. All the moisture must be dried out of surfacer coats after the sanding operation and before another coat is applied. Sanding used to be done dry with dry sand paper. Such work generally impaired the health of the workmen and it was really an occasion for thanksgiving when waterproof sand paper was developed. Waterproof sand paper may be used in water, gasoline and similar liquids without affecting the paper. The moisture assists in smooth abrasion and keeps the sanded particles from wadding up and causing deep scratches on the surface. Naturally there is no dust.



Ventilation and good light are two of the essentials in obtaining the best results when spray finishing products and the illustration above shows how these things are provided in one type of spray finishing booth



The workman above is applying the finishing coat to electric drills that are delivered to the booth by means of an overhead monorail conveyor. Notice the ventilator in the top of this type of spray booth

Finishing Coats—After the final surfacer coat is smooth, level, clean and dry, the piece is ready for the finishing coats. These are applied in succession (allowing drying time) with a light water-sanding between every one or two coats. The number of coats applied generally depends on the price for which the article is to sell. Many oil-base materials are never sanded but are given a final coat of clear varnish or a glossy color enamel. Some lacquer finishes are left with their natural glow on the final coat; others are highly polished; still others are sprayed with a coat or two of clear lacquer. Here, again,

the counsel of the material manufacturer can help attain the desired effect at a minimum cost.

Crackle, Crystalized and Similar Irregular Finishes—These do not generally require much care in bringing up a smooth surface. Slight depressions are excused for the irregularity of the finish. Such type of finishes are becoming more and more popular, especially on the smaller articles.

The Equipment—Little can be said generally on adequate equipment. We have all seen some barbers do more with one razor, a nib of a comb, a pair of shears and a hair brush than others right by their side could do with a dozen tools to their one. This much can be said, however. We know the man with the few tools kept them in good order and clean. In finishing rooms, the plant having the highest efficiency and most labor saving devices will naturally have the lowest finishing cost which is what we all seek. This thought leads us to a very important feature in shop efficiency and good finishing results: Good Housekeeping.

Good Housekeeping—There is nothing more worthy of consideration than a clean finishing room. This is not news. It is being talked of every day by fire underwriters, efficiency men, managers and the workmen themselves. Nevertheless there is always a great deal of room for improvement, and the fact remains that some people are better housekeepers than others. Keeping the spray guns, hoses, fluid containers, etc., clean and putting them away clean in a tool or equipment room every night makes the equipment last longer, render better service and the workman has no trouble with plugged guns or distorted sprays, clogged hoses, etc., when he starts his work the following morning. He is able to put in a full production day. It is the experience of virtually every spray equipment manufacturer that about 98 per cent of the service calls made are attributable to lack of cleanliness. Paints and lacquers are sticky and gummy but that offers no excuse why the places where they are used and the tools employed in their application need be "all gummed up."

Cleaning the Spray Gun—Some spray guns are easier to clean than others, but the hardest of them requires only a few minutes. First, the fluid hose or cup should be detached from the gun and solvent or cleaner sprayed through the gun until it is thoroughly clean inside. The gun should then be blown out clean by either cupping the hand over the air cap when the trigger is pulled, thus forcing the air back down through the fluid nozzle, or by using an air blow gun. The air cap should then be removed and immersed in cleaning fluid or solvent and a stiff *bristle* brush (not wire) should be used to scrub off all paint from the surface. It should then be blown out. The fluid tip should be wiped off with a clean cloth saturated with solvent. When the gun, fluid tip and air cap are clean and dry, they should be assembled and laid away for the night. The gun and air cap (which are frequently made of aluminum) should not be left submerged in caustic (lye) solutions as the metal will become pitted, porous and of no further service in a very short time. To leave the gun submerged in solvent long frequently takes all the lubricant out of the packing and causes the gun to work stiffly and stutter when spraying. The instruction sheets of the manufacturer should be followed closely in cleaning this equipment.

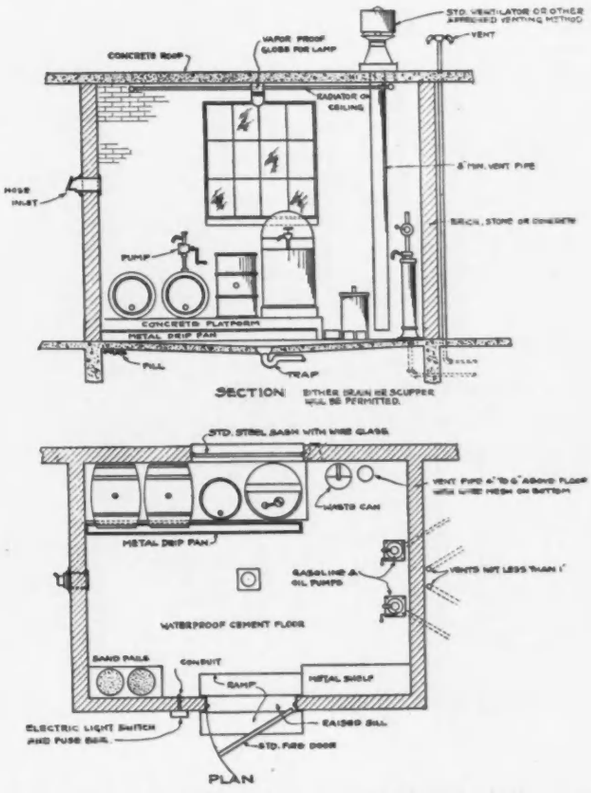
The spray gun must be cleaned from time to time while spraying during the day. This merely requires the removal of the air cap, the submersion of it in cleaning fluid or solvent and the scrubbing of it with a stiff bristle brush. The fluid tip is wiped clean with a cloth saturated in clean solvent, and the air cap screwed back on.

Cleaning the gun is very simple and takes a shorter length of time to do than it does to read this if the cleaning is done just after use. If this simple task is delayed, however, the material will cake up in the orifices and be very hard to clean. It is then that workmen take pieces of wire, nails, or even chisels to pry around the air cap, distort the orifices and in consequence soon have a gun that does not spray perfectly. Air caps for various brands of guns cost approximately $2 each. They are made either of aluminum or brass. It doesn't take much of a scratch to distort an orifice in such metals. The fluid tips vary in price between $1.25 and $2. Scraping dry paint or lacquer off the end of the tip not infrequently renders it unfit for further use.

Cleaning the Hose—By using the hose cleaner described in the previous article and then washing the outside of the air and fluid hose every night the hoses will last much longer and the danger of plugging up the gun with a piece of paint "skin" or chunk of dry lacquer during the following day's spraying is practically eliminated.

Cleaning the Containers—Suction type gun cups can be easily rinsed out in a small pail of cleaning liquid or solvent. Gravity feed containers should be drained when spraying is finished and rinsed with solvent, then wiped clean both inside and out with a clean cloth saturated either with cleaning fluid or solvent. Pressure feed containers are easy to clean because of the inserts. The inserts should be emptied, rinsed with solvent and cleaned inside and out as suggested with the gravity feed containers. The bottom of outside shell and the lid of the pressure feed tank should be wiped off clean also.

Cleaning the Spray Booth—Cleaning the interiors of spray booths and ducts may be made easier by previously spraying on coatings to prevent the adhesive spraying materials from drying fast on the wall of the booth or duct. In booths, where lacquers are sprayed, some liquid soap compound or chemical cleaning compound that will dry smooth and non-adhesive should be applied. This surface can be easily washed down with warm water or low pres-



Plan and sectional views of a spray finishing installation for storing and mixing materials that is so designed as to reduce the chances of fire to a minimum

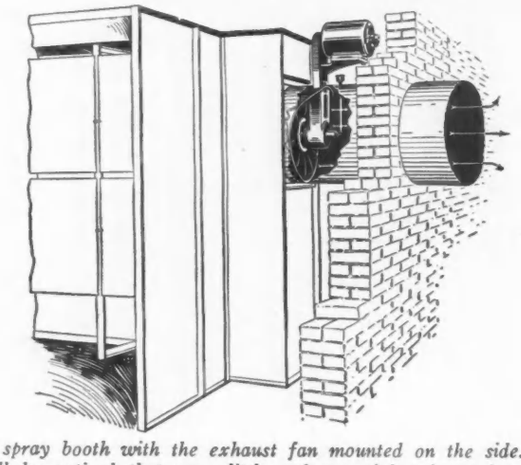
sure steam. Where paints, varnishes, etc., are sprayed, the interior of the spray booth and ducts should be coated with heavy oil or cup grease to which is pressed a single layer of manila or craft paper. By frequently changing these papers, a clean booth is always assured. These cleaning operations should be done as soon as work ceases each day. The longer they are left on, the more difficult the cleaning process becomes.

The Exhaust Fan Blades—If these are located in the duct, they should be cleaned daily. If it is not possible to remove the blades and wash them in cleaning liquid or solvent, they should be scraped thoroughly clean. A great deal of the spray dust collects on the blades and if allowed to accumulate generally puts the fan blades out of balance. Having the blades out of balance is very severe on the bearings and under such a strain they soon wear out, overheat and several fires are known to have started from this condition. The exhaust fan motors and bearings should be oiled frequently.

If these are located in the exhaust duct they should be cleaned in the same way as is the spray booth, and as often. It is not good policy to spray cleaning liquids in a spray booth. If it is necessary, however, it is recommended that nothing with a higher flash point than kerosene be used. Spray shops that do any quantity of spraying save the scrapings and cleaning fluid. These are sold to be treated and re-distilled for pigment and cleaning fluid or solvent. The scrapings, etc., should not be left about the floor or in open containers. They should be kept in covered containers at all times to eliminate the possibility of fire.

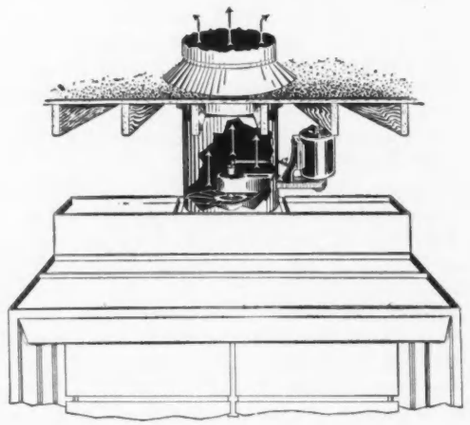
Fire Hazards—Anything that embraces speed entails a greater hazard than does the slower method. There were less hazards (traffic accidents) in the horse and buggy era than there are today with the automobile rolling down the city streets at 30 miles an hour. Greater driving caution must be exercised. In the days of the paint brush finishing methods, processes were slower, less material was consumed in the industry, and less work done per man-hour. There was consequently less possibility of fire hazard then than in today's employment of the spray gun which is many times faster; much more material is being applied, and the man-hour production is much increased. A more strict observance of "good housekeeping" is needed.

By confining the spraying to a booth or by having adequate ventilation in the spray room, keeping the floor, walls, piping, etc. (especially warm surfaces) clean and free from spray dust, and by keeping the materials in sealed containers in one place instead of scattered all over the shop, one can be sure of freedom from the usual fire hazards. As little material as possible should be kept in the finishing room. The material storage room is the proper and safe place to keep all coating materials, solvents, oils, gasolines, etc.



A spray booth with the exhaust fan mounted on the side. It will be noticed that very little exhaust piping is used, which is an advantage in preventing fires

The Store Room—These should be built fireproof with plenty of ventilation to preclude the storing up of combustible gases. The materials and all rags (especially those oil-soaked) should be kept in covered containers, also. It is well to remember that linseed oil and similar oxidizing agents used to promote drying create the hazard of spontaneous ignition. Many finishing rooms have their material storeroom fitted with an airtight door and in the wall about four feet from the ground they have an opening for inserting a fire hose for flooding the room in case of fire. Cleanliness is necessary in the store room.



An exhaust fan mounted on top of the spray booth in this manner requires a special type of motor, thereby increasing costs and maintenance of equipment

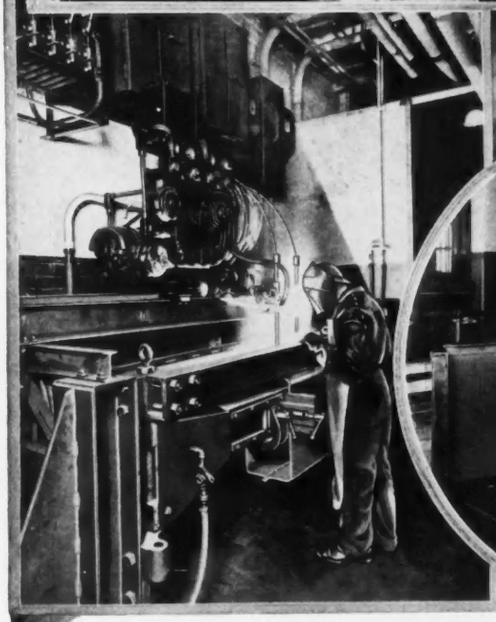
The Finishing Room—This should be located either on the top floor of a fireproof building or in a separate one-story fireproof building. In either case, such a position makes possible the erection of adequate ventilation at minimum expense and affords a maximum of lighting facilities, sky lights, etc. Wherever possible, up to date finishing rooms have a store room as described for temporary storage of their coating materials, and a warehouse for the bulk of the stock. In this way they minimize the hazard of loss by fire still more.

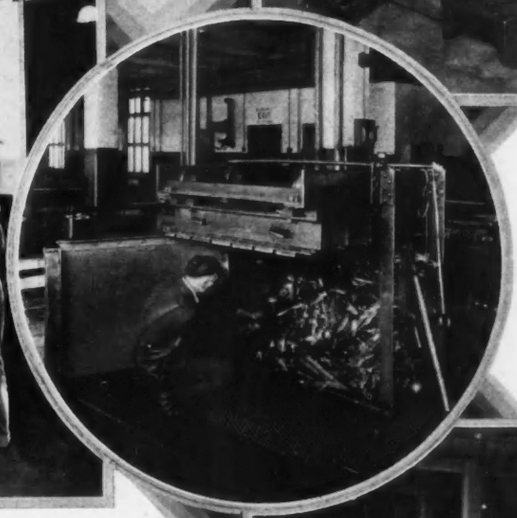
The Hazard of Lacquer Vs. Oil Base Materials—The widespread use of lacquers and similar quick drying materials is a result of their having lent themselves so well to quantity production methods and cost reduction demands. These materials had to be sprayed and the use of the spray gun for these materials plainly evidenced the high desirability of spray finishing. Many surfaces are also sprayed with oil base materials (paints, varnishes, etc.), and will most likely continue to be finished with this type of material. In fact, the same plant might easily spray, successively, lacquers, shellacs, ordinary paints, varnishes, etc. The spray gun is not confined to any one type of material but lends itself to the quick application of all.

So far as the general hazard is concerned, there is relatively no difference between oil base materials and shellacs on the one side and lacquers on the other. Lacquers involve a greater dust hazard than the other materials but lacquer spray dust is easier to clean up than that of oil base materials. While paints, varnishes, etc., involve the hazard of spontaneous ignition (this was true during the old brush method régime as well as at the present time), lacquers, as a rule, do not. Lacquer thinners or solvents are usually more volatile than those of paints, etc., but on

(*Continued on page* 63)

Twenty Pictured Ideas in *Manufacturing Telephone Apparatus*

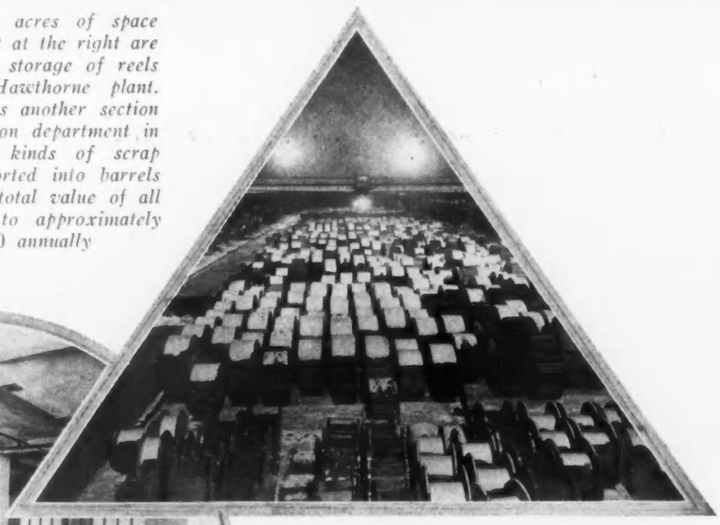




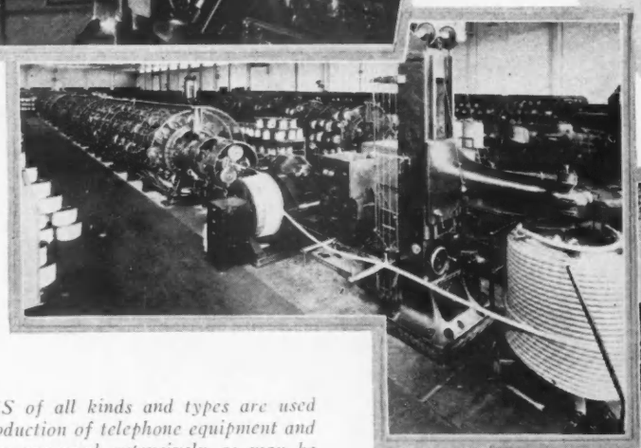
THE production of telephone apparatus and cables constitutes one of the most important branches of the electrical industry today and one of the largest manufacturers of this equipment in this country is the Western Electric Company, in whose various factories the views on this and the three following pages were made

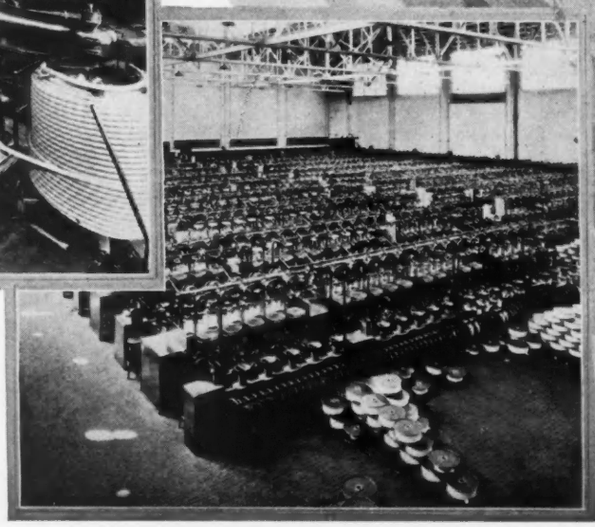
COILS play an important part in the construction of telephone apparatus and these are produced in quantities in the Hawthorne plant of the Western Electric Company in the department shown in the view at the top of this page, while the man in the helmet directly below is watching the progress of an automatic electric seam welding machine as it is used in the manufacture of loading coil cases. The young woman working with the screw driver is one of the many employed on different assembly operations. In the circle is one of several baling presses used to compress scrap material into convenient form for handling. In the Western Electric plants nearly all packing for shipment is handled on such conveyor equipment as that shown in the view at the right

ACRES upon acres of space such as that at the right are required for the storage of reels alone at the Hawthorne plant. Directly below is another section of the reclamation department in which different kinds of scrap materials are sorted into barrels for sale. The total value of all waste amounts to approximately $7,000,000 annually



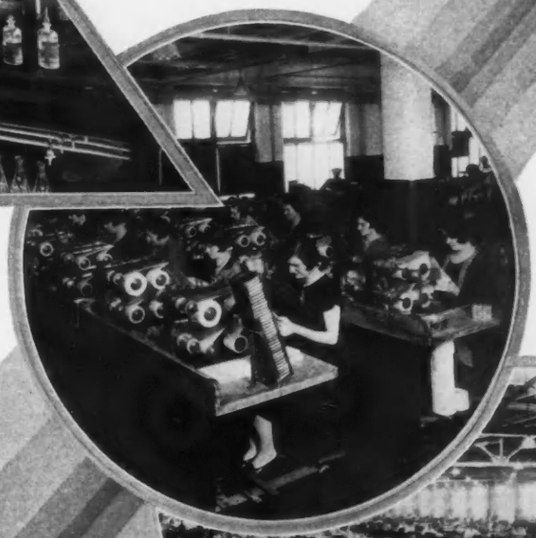
IT WILL be noticed from all of the illustrations shown that particular care has been exercised in the various plants of the Western Electric Company to provide the best in the way of efficient machinery, plenty of natural light, good ventilation and safeguards on all machines for the protection of the workmen. Much of the equipment used is of a special nature





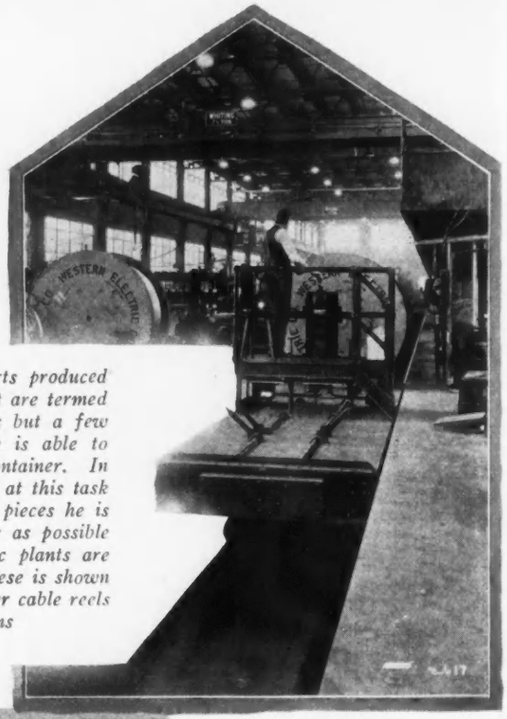
MACHINES of all kinds and types are used in the production of telephone equipment and milling machines are used extensively as may be seen from reference to the illustration in the center of the page, which shows the milling machine section of the Hawthorne plant. Spinning highways of speech might well be the title of the illustration directly above. It is in this room that miles upon miles of cables are produced. In another department, shown at the right, many batteries of machines automatically cover bare copper wire with paper insulation in the course of preparing it for making into cables

WINDING paper condensers is comparatively easy at Hawthorne when women employees operate such especially designed bench type automatic winding machines as those shown in the illustration directly below. Many benches of this type are required to turn out the daily needs for these parts of an ordinary telephone



ON THIS page again will be noticed the preparations for mass production, requiring vast areas to accommodate the necessary facilities. Even laboratories are essential and one of these is shown directly above. Here chemists are constantly at work testing materials and developing new or better methods to still further improve present manufacturing processes

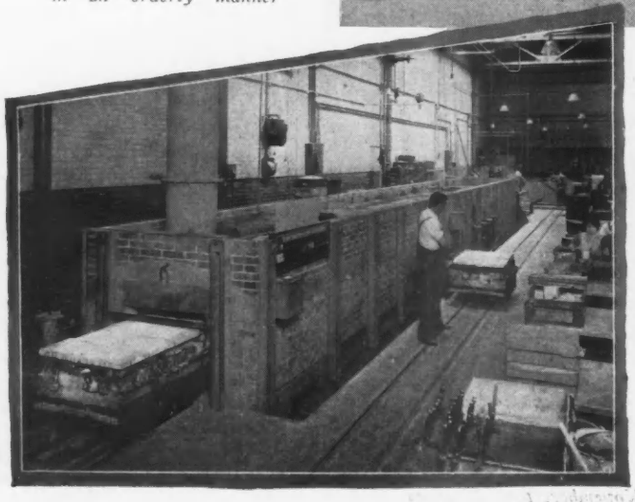
NOTICE the clean orderly arrangement and the good lighting in the Hawthorne relay assembly and adjusting departments as it is shown in the view in the center of this page. Directly above is what might be said to be industry's adaption of the conventional merry-go-round. It is a continuous plating machine that has speeded up the finishing of millions of parts in the Hawthorne works. It is entirely automatic in operation and requires but one attendant. At the left is another illustration in which is still further evidence of clean orderly surroundings and ample natural light. Notice the many different ways of handling materials in this plant



CAREFUL check on the millions of parts produced at Hawthorne each year is kept in what are termed counting departments. The operator counts but a few parts and then by weighing the others he is able to determine the number of pieces in each container. In the view at the left the operator is engaged at this task and the pans in the foreground contain the pieces he is counting. It will be noticed that in so far as possible all materials and parts in Western Electric plants are handled with mechanical devices. One of these is shown in the view at the right as it is used to deliver cable reels from inspection to sealing positions

SINCE there are many kinds and types of parts entering into the construction of telephones, those that are considered standard to several assemblies are made in large quantities and at one time. This effects considerable saving in production cost, but it involves the storage of the extra parts for future use. How this is done in the Hawthorne plant is shown from the view of the manufactured parts storeroom shown in the view at the right. In some cases complete assemblies are wrapped in one package, while in others separate parts are wrapped in bundles, and these after marking for identification are stored in an orderly manner

AS was explained previously, acres and acres of space are needed for the storage of reels for cables in the various Western Electric plants, and to handle these reels from one department to another requires many different types of handling equipment. In the view below is one of the traveling overhead cranes equipped with a special lifting attachment as it is used for handling reels of new cable during inspection operations. At the lower left is a group of kilns that are used for firing porcelain and carbon blocks. These materials are loaded upon the narrow gage flat cars shown, and sixteen of the cars are placed in the furnaces at one time



An Outstanding Example of Motor Repair Shop Organization

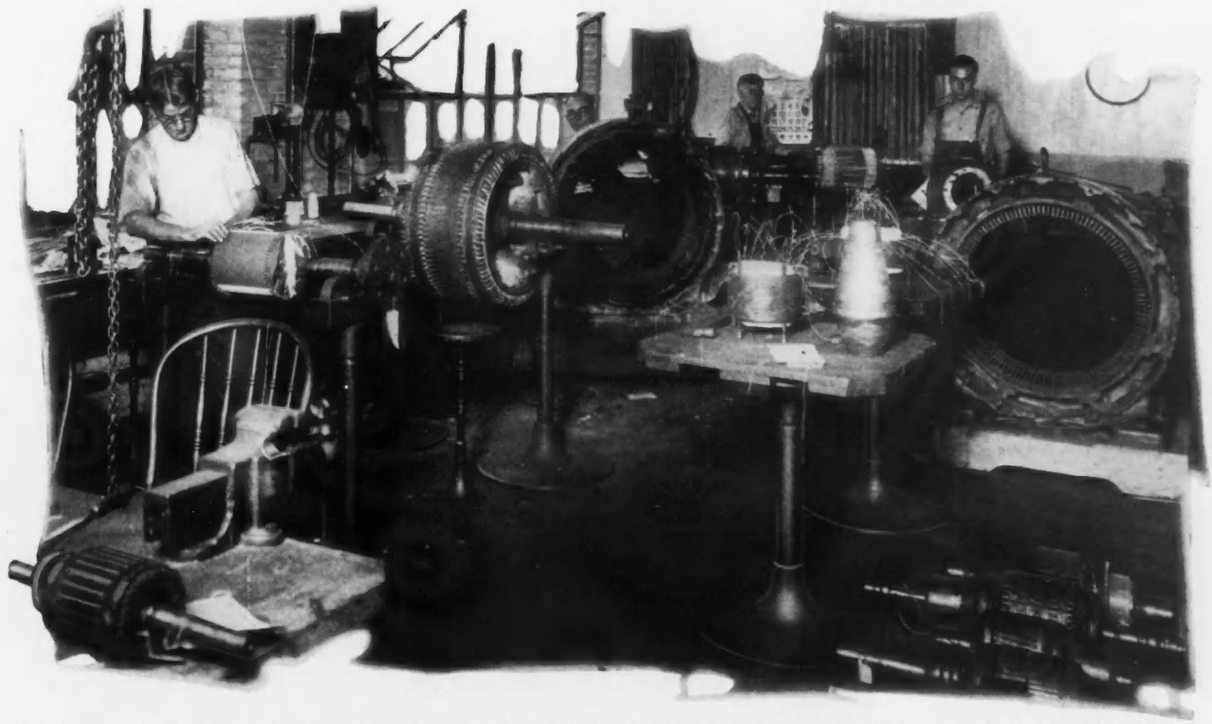
By William W. Baxter
Associate Editor, Electrical Manufacturing

ONE of the outstanding motor repair shops that has come to the attention of Electrical Manufacturing is that of the J. & H. Electric Company, 200 Richmond St., Providence, R. I., and the following describes its facilities and operating methods

IN the first of this group of three articles, which appeared in the October issue of Electrical Manufacturing, the four general classes of motor repair shops were described and this information was supplemented by a brief history of the business of the J. & H. Electric Company, located at 200 Richmond Street, in Providence, R. I. The following will have to do with the methods and practices of this organization and particularly that part of the business relating to the repair of electrical devices and apparatus.

As has been explained previously, the J. & H. Electric Company conducts an extensive general electrical contracting business and at the same time manufactures the well-known D. & W. magnetic chucks, but these branches of this company's business are conducted entirely independent of the motor repair work.

All work on chucks is done in the basement of the repair shop where ample facilities have been provided for such manufacturing purposes, while the second and third floors of the building serve as stock rooms for materials and



One corner of the heavy repair section in the shop of the J. & H. Electric Company showing the facilities available for this class of work. Monorail conveyors handle the heavy apparatus, and, as may be seen, stands fitted with rollers are used for making repairs to heavy rotors and armatures. In the rear is the rack and a shear for cutting insulation

THREE views in the motor repair shop of the J. & H. Electric Company, showing some of the equipment. That at the top of the page shows a small section of the machine shop. A bench runs along one wall of the shop, and parallel to this are grouped the different machines, which consist principally of lathes

IN the center of the page is the coil-winding department. It is fitted with the necessary winding, spreading and taping machines of different types to accommodate any winding wanted. At the right is a view in the basement of the shop devoted to the manufacture of the D. & W. magnetic chucks, which is part of the business

parts, and as a salesroom for motors, generators and control apparatus.

The first floor of the shop, except for the sales office, is used for repair work alone. It is essentially divided into departments or sections, each being assigned to one phase of the work, and in order that this arrangement may be understood reference should be made to the four floor plans of the shop that appeared in the October issue of ELECTRICAL MANUFACTURING.

All work coming into the shop is received by motor truck at the rear. From the trucks it is handled to the test floor by an overhead monorail conveyor or by hand trucks. On the test floor, which is near the elevator shaft and in the center of the shop, it is marked for identification, as will be explained in a later article, after which every part of the motor, generator or whatever the apparatus may be, is completely examined for defects and tested for performance. All conditions requiring attention are noted on a form provided for that purpose, by the inspector, and then the job passes to the

proper section of the repair shop for reconditioning.

Fans, appliances and in fact any device using fractional horsepower motors pass directly to one section of the shop set aside for work of this kind. Here are provided such benches and small tools as are needed for dismantling and assembling these devices. Of course, any machine work or work on coils or windings is moved to these respective departments, as will be explained.

If the motor is too large for the fractional horsepower or small motor section to repair, it is moved to a division of the shop especially equipped for any kind of heavy work. In this department are benches and portable stands upon which to mount the repair jobs. For the larger types of armatures there are portable stands fitted with rollers in which the armature shafts rotate while undergoing repairs. A monorail conveyor also serves this section of the shop.

Miscellaneous light repairs and those to control equipment are made in the center section of the shop, where adequate facilities have been provided for this kind of work.

In the rear of the small motor section of the repair shop is the machine tool equipment. It consists essentially of lathes and drills of various sizes and capacities. When grinding, shaping or milling operations are required provisions are made for this work to be done in the magnetic chuck department in the basement.

Dipping tanks and baking ovens are located at the rear of the machine department and the operators of this equipment also make all carbon brushes on saws provided for this purpose. In the same manner there is a rack and a cutting shear for sheet insulation in the heavy motor repair section of the shop.

To make the many different kinds and types of coils and windings required in a large motor repair shop there must be considerable coil winding, spreading and taping equipment. In the J. & H. Electric Company's shop this is all grouped at the rear of the heavy motor repair section. Facilities are available for meeting any winding requirements.

In this connection it should be interesting to know that no wire for magnets, coils or windings is handled in the coil winding department. All wire of this kind is stored on the second floor of the shop, directly over the coil winding machines. From these storage racks the different kinds of wire wanted are placed in additional racks from

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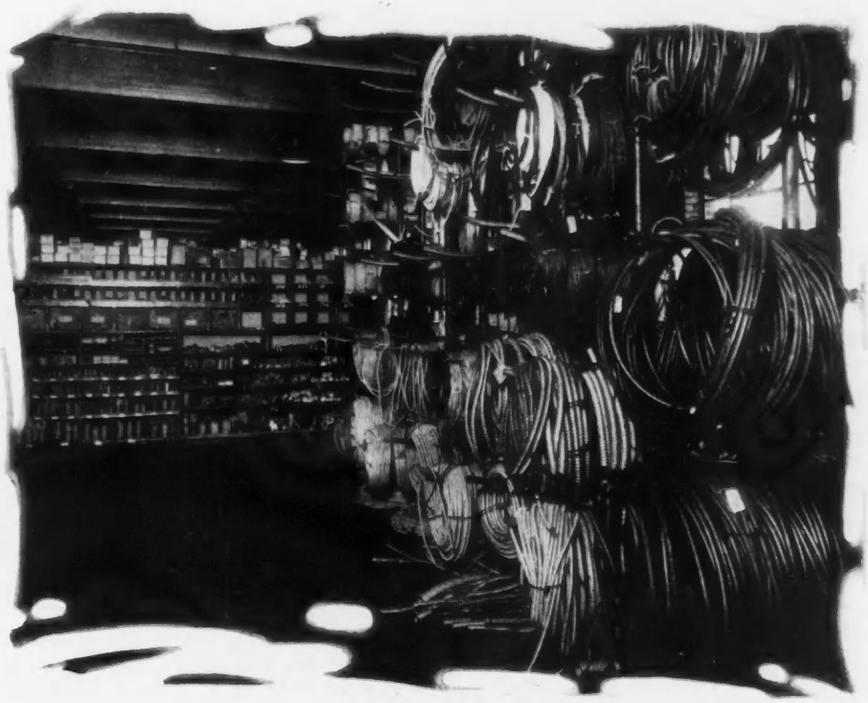


NOTICE the neat and orderly arrangement in the storeroom of the J. & H. Electric Company. It is here that all spooled wire is stored for making coils and windings. In the illustration above the small rack carries the spools of wire that are being used to feed the winding machines on the floor below

SINCE part of the business of the company is general contracting, large supplies of contracting materials must be carried in stock at all times. The view at the left shows part of the storeroom for this class of material. The rack is used for cable and conduit of many sizes and capacities, while one row of storage racks or bins for small parts may be seen at the back

Rod and Wire Forming Data and Methods

In the following, which is the concluding instalment of a series of articles, the author gives considerable information about forming rods and wires

By J. K. Olsen
Chief Draftsman, Stewart-Warner Speedometer Corp.

THIS, the concluding instalment of this series on the forming of rods and wires, contains some valuable information for the engineer in the way of a handy chart for determining the length of stock required, and in addition there is a table giving the area of circles and the volume of round rods per linear foot.

The following table is for calculating weights of materials for round stock not otherwise given in weight tables.

This table has more decimal places than generally given in ordinary data of this kind.

It is especially in the smaller sizes where the decimals herewith given will give a closer result in the final amount than in most of the ordinary data.

The volume per foot is given directly and a simple multiplication by the weight constant will give the weight per linear foot.

Figure 10 shows a chart which may be used for checking the required length of stock per 100 pieces, of a part not exceeding 12 inches in length.

The chart is not furnished for the accurate determination of stock lengths, but is offered only as a reference or a means of checking other amounts as the divisions are not sufficiently accurate to give anything except approximate results.

The following example will give an illustration of the use of the chart.

Supposing 1000 pieces of insulated wire were to be purchased, each piece to be 7 3/16-in. long, how long a piece of wire in feet would be required? 1000 times 7 3/16 in. = 7187 in., this divided by 12 = 599 ft. Checking this total from the chart we find opposite 7 3/16 in. approximately 60, and as the chart furnishes only the lengths required per 100 ft. we must multiply the 60 by 10, which will give 600 ft. showing that the 599 figure is correct.

In the customary manner, 5 per cent for scrap allowance should be added, which will make the final amount 630 ft. required per 1000 pieces.

The same problem is involved when ordering other materials such as leather strips, cables, metal strips, chain, etc., and the chart will prove to be a rapid means for checking the accuracy of the final estimates.

A short cut in figuring the weight per 1000 pieces for all strip or sheet stock is hereby given.

The method is simply to multiply the area of one piece by the weight of the raw material per square foot, and multiply this by the constant 7.292.

A = Area of one piece in square inches.
W = Weight per square foot of raw material.
7.292 = Constant.
Formula for weight per 1000 pieces = A × W × 7.292.

This formula includes 5 per cent for scrap.

Note that the area of one piece in square inches must include the scrap allowance for one piece, that is, if the part is a stamped (punch press) part the area for one piece is the width of strip times the multiple.

The area of flat bar stock where a plain cut-off tool

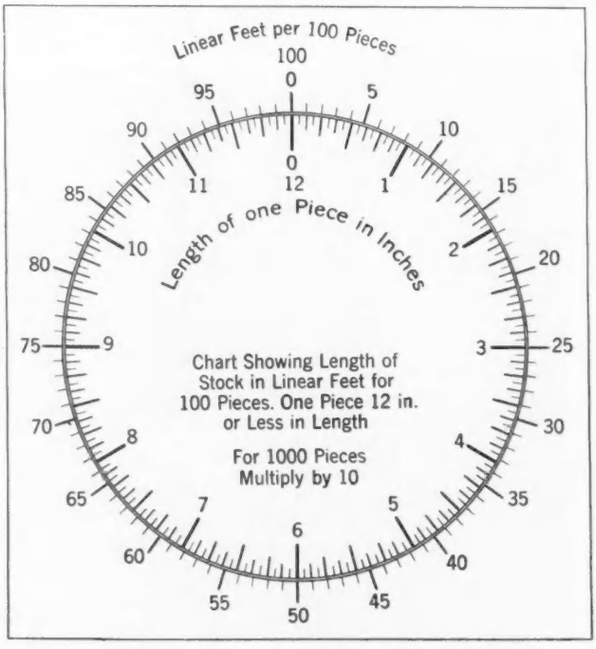

Linear Feet per 100 Pieces
Length of one Piece in Inches
Chart Showing Length of Stock in Linear Feet for 100 Pieces. One Piece 12 in. or Less in Length
For 1000 Pieces Multiply by 10

Figure 10
A handy chart showing the length of stock in linear feet for 100 pieces of a part not exceeding 12 inches in length

is used must be so determined that the length of the piece must include the cut-off tool allowance, providing cut-off tool is used.

The formula is obtained from the following factors:

$$\frac{A \times W \times 1000 \times 1.05}{144} = \frac{A \times W \times 1050}{144} = A \times W \times 7.292.$$

Example: The following is an example of the ordinary method of determining weights:

A = 15.750 sq. in. (3 × 5.250).

W = 4.501 (weight per square foot of .1019 sheet brass).

$$\frac{15.750 \times 4.501 \times 1000 \times 1.05}{144} = 516.9 \text{ or } 520 \text{ lb.}$$

Taking this same example and using a simplified method we have:

$15.750 \times 4.501 \times 7.292 = 516.9.$

This would be made 520 lb. which would bring the scrap allowance below 6 per cent.

The amount of variation in the length of a strip of raw material caused by twisting it presents a problem which cannot be solved with any positive degree of accuracy since the kind and thickness, in relation to the width of metal will greatly influence the result.

It is possible, however, to determine approximately the amount of variation and in Figure 11 a fairly accurate formula is shown which has proved its value on sample parts of this type.

It may readily be seen that the developed blank is 1/32 in. longer than the finished part; in other words, the part is shortened by the twisting action.

In view of the fact that the kind and width of the metal play such important parts in determining the shortening effect of the twist, it is always advisable to make a sample for checking the developed length of parts of this kind, especially where quantity production is concerned.

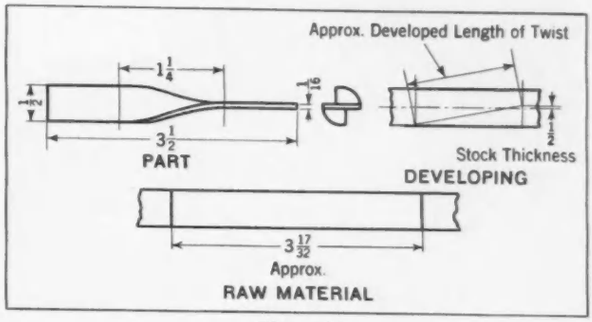


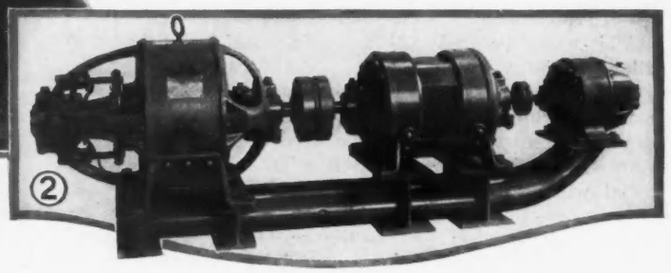
Figure 11

This is an example of the method employed for determining the amount of stock required in a piece such as that shown

Area of Circles and Volume per Linear Foot of Round Rolls

Sizes in Inches	Area of Circle	Volume per Linear Foot	Sizes in Inches	Area of Circle	Volume per Linear Foot	Sizes in Inches	Area of Circle	Volume per Linear Foot	Sizes in Inches	Area of Circle	Volume per Linear Foot
1/64	0.00019175	0.0023010	1	0.78540	9.4248	4-3/16	13.772	165.26	8-1/8	51.849	622.19
1/32	0.00076699	0.0092039	1-1/32	0.83524	10.023	4-1/4	14.186	170.23	8-3/16	52.649	631.79
3/64	0.0017257	0.020708	1-1/16	0.88664	10.640	4-5/16	14.607	175.28	8-1/4	53.456	641.47
1/16	0.0030680	0.036816	1-3/32	0.93957	11.278	4-3/8	15.033	180.40	8-5/16	54.269	651.23
5/64	0.0047936	0.057523	1-1/8	0.99402	11.928	4-7/16	15.466	185.59	8-3/8	55.088	661.06
3/32	0.0069029	0.082835	1-5/32	1.0500	12.600	4-1/2	15.904	190.85	8-7/16	55.914	670.97
7/64	0.0093957	0.11278	1-3/16	1.1075	13.290	4-9/16	16.349	196.19	8-1/2	56.745	680.94
1/8	0.012272	0.14726	1-7/32	1.1666	13.999	4-5/8	16.800	201.60	8-9/16	57.583	691.00
9/64	0.015532	0.18638	1-1/4	1.2272	14.726	4-11/16	17.257	207.08	8-5/8	58.426	701.11
5/32	0.019175	0.23010	1-9/32	1.2893	15.472	4-3/4	17.721	212.65	8-11/16	59.276	711.31
11/64	0.023202	0.27841	1-5/16	1.3530	16.236	4-13/16	18.190	218.28	8-3/4	60.132	721.58
3/16	0.027612	0.33134	1-11/32	1.4182	17.018	4-7/8	18.665	223.98	8-13/16	60.994	731.93
13/64	0.032405	0.38886	1-3/8	1.4849	17.819	4-15/16	19.147	229.76	8-7/8	61.862	742.34
7/32	0.037583	0.45100	1-13/32	1.5531	18.637	5	19.635	235.62	8-15/16	62.737	752.84
15/64	0.043143	0.51772	1-7/16	1.6230	19.476	5-1/16	20.129	241.55	9	63.617	763.40
1/4	0.049087	0.58904	1-15/32	1.6943	20.332	5-1/8	20.629	247.55	9-1/16	64.504	774.05
17/64	0.055415	0.66498	1-1/2	1.7671	21.205	5-3/16	21.135	253.62	9-1/8	65.397	784.76
9/32	0.062126	0.74551	1-17/32	1.8415	22.098	5-1/4	21.648	259.78	9-3/16	66.296	795.55
19/64	0.069220	0.83064	1-9/16	1.9175	23.010	5-5/16	22.166	265.99	9-1/4	67.201	806.41
5/16	0.076699	0.92039	1-19/32	1.9949	23.939	5-3/8	22.691	272.29	9-5/16	68.112	817.34
21/64	0.084560	1.0147	1-5/8	2.0739	24.887	5-7/16	23.221	278.65	9-3/8	69.029	828.35
11/32	0.092806	1.1137	1-21/32	2.1545	25.854	5-1/2	23.758	285.10	9-7/16	69.953	839.44
23/64	0.10143	1.2172	11/16	2.2365	26.838	5-9/16	24.301	291.61	9-1/2	70.882	850.58
3/8	0.11045	1.3254	1-23/32	2.3201	27.841	5-5/8	24.850	298.20	9-9/16	71.818	861.82
25/64	0.11984	1.4381	1-3/4	2.4053	28.864	5-11/16	25.406	304.87	9-5/8	72.760	873.12
13/32	0.12962	1.5554	1-13/16	2.5802	30.962	5-3/4	25.967	311.60	9-11/16	73.708	884.50
27/64	0.13978	1.6774	1-7/8	2.7612	33.134	5-13/16	26.535	318.42	9-3/4	74.662	895.94
7/16	0.15033	1.8040	1-15/16	2.9483	35.380	5-7/8	27.109	325.31	9-13/16	75.622	907.46
29/64	0.16126	1.9351	2	3.1416	37.699	5-15/16	27.688	332.26	9-7/8	76.589	919.07
15/32	0.17257	2.0708	2-1/16	3.3410	40.092	6	28.274	339.29	9-15/16	77.561	930.73
31/64	0.18427	2.2112	2-1/8	3.5466	42.559	6-1/16	28.866	346.39	10	78.540	942.48
1/2	0.19635	2.3562	2-3/16	3.7583	45.100	6-1/8	29.465	353.58	10-1/16	79.525	954.30
33/64	0.20881	2.5057	2-1/4	3.9761	47.713	6-3/16	30.069	360.83	10-1/8	80.516	966.19
17/32	0.22166	2.6599	2-5/16	4.2000	50.400	6-1/4	30.680	368.16	10-3/16	81.513	978.16
35/64	0.23489	2.8187	2-3/8	4.4301	53.161	6-5/16	31.296	375.55	10-1/4	82.516	990.19
9/16	0.24850	2.9820	2-7/16	4.6664	55.997	6-3/8	31.919	383.03	10-5/16	83.525	1002.3
37/64	0.26250	3.1500	2-1/2	4.9087	58.904	6-7/16	32.548	390.58	10-3/8	84.541	1014.5
19/32	0.27688	3.3226	2-9/16	5.1572	61.886	6-1/2	33.183	398.20	10-7/16	85.563	1026.8
39/64	0.29166	3.4999	2-5/8	5.4119	64.943	6-9/16	33.824	405.89	10-1/2	86.590	1039.1
5/8	0.30680	3.6816	2-11/16	5.6727	68.072	6-5/8	34.472	413.66	10-9/16	87.624	1051.4
41/64	0.32232	3.8678	2-3/4	5.9396	71.275	6-11/16	35.125	421.50	10-5/8	88.664	1064.0
21/32	0.33824	4.0589	2-13/16	6.2126	74.551	6-3/4	35.785	429.42	10-11/16	89.710	1076.5
43/64	0.35454	4.2545	2-7/8	6.4918	77.902	6-13/16	36.450	437.40	10-3/4	90.763	1089.2
11/16	0.37122	4.4546	2-15/16	6.7771	81.325	6-7/8	37.122	445.46	10-13/16	91.824	1101.9
45/64	0.38829	4.6595	3	7.0686	84.823	6-15/16	37.800	453.60	10-7/8	92.886	1114.6
23/32	0.40573	4.8688	3-1/16	7.3662	88.394	7	38.485	461.82	10-15/16	93.957	1127.5
47/64	0.42357	5.0828	3-1/8	7.6699	92.039	7-1/16	39.175	470.10	11	95.033	1140.4
3/4	0.44179	5.3015	3-3/16	7.9798	95.758	7-1/8	39.871	478.45	11-1/16	96.116	1153.4
49/64	0.46039	5.5247	3-1/4	8.2958	99.550	7-3/16	40.574	486.89	11-1/8	97.205	1166.5
25/32	0.47936	5.7523	3-5/16	8.6179	103.41	7-1/4	41.282	495.38	11-3/16	98.301	1179.6
51/64	0.49874	5.9849	3-3/8	8.9462	107.35	7-5/16	41.997	503.96	11-1/4	99.402	1192.8
13/16	0.51849	6.2219	3-7/16	9.2806	111.37	7-3/8	42.718	512.62	11-5/16	100.51	1206.1
53/64	0.53861	6.4633	3-1/2	9.6211	115.45	7-7/16	43.445	521.35	11-3/8	101.62	1219.4
27/32	0.55913	6.7096	3-9/16	9.9678	119.61	7-1/2	44.179	530.15	11-7/16	102.74	1232.9
55/64	0.58003	6.9604	3-5/8	10.321	123.85	7-9/16	44.918	539.02	11-1/2	103.87	1246.4
7/8	0.60132	7.2158	3-11/16	10.680	128.16	7-5/8	45.664	547.97	11-9/16	105.00	1260.0
57/64	0.62299	7.4759	3-3/4	11.045	132.54	7-11/16	46.415	556.98	11-5/8	106.14	1273.7
29/32	0.64503	7.7404	3-13/16	11.416	136.99	7-3/4	47.173	566.08	11-11/16	107.28	1287.4
59/64	0.66747	8.0096	3-7/8	11.793	141.52	7-13/16	47.937	575.14	11-3/4	108.43	1301.2
15/16	0.69029	8.2835	3-15/16	12.177	146.12	7-7/8	48.707	584.48	11-13/16	109.59	1315.1
61/64	0.71349	8.5619	4	12.566	150.79	7-15/16	49.483	593.80	11-7/8	110.75	1329.0
31/32	0.73707	8.8448	4-1/16	12.962	155.44	8	50.265	603.18	11-15/16	111.92	1343.0
63/64	0.76104	9.1325	4-1/8	13.364	160.37	8-1/16	51.054	612.65	12	113.10	1357.2

The Electrical Arc Welding

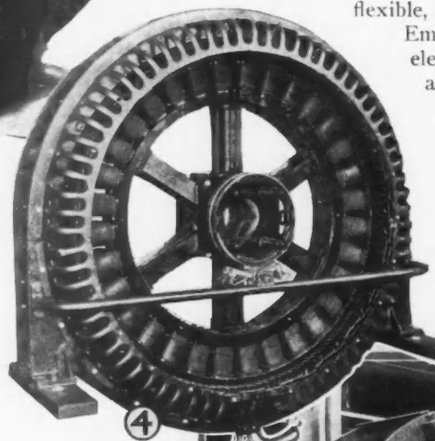


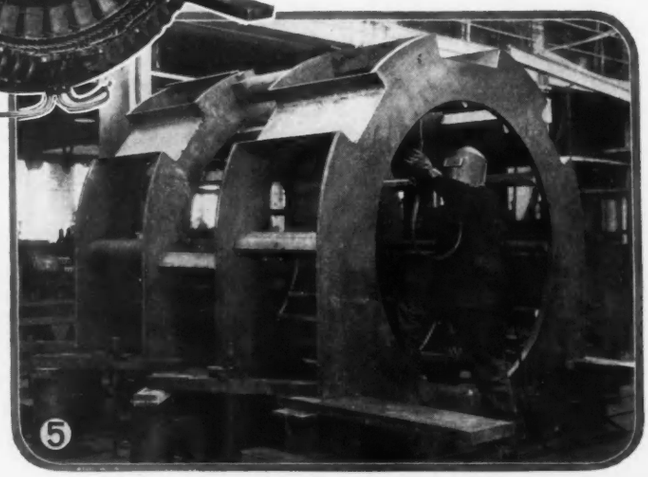
By HENDLEY N. BLACKMON
Westinghouse Electric and Manufacturing Company

OVERTHROWING the century-old foundry practice, electrically welded structural steel is replacing castings in sizable electric machinery because the fabricated machine is lighter, stronger and takes less time to build. These advantages accrue mainly because of: elimination of patterns; freedom from foundry limitations; less machining is required, use of steel, instead of cast iron, gives greater strength with less weight; ease of changing sizes—welding is flexible, and shorter deliveries to customers.

Employing castings for purposes to which electric welding is adapted means waste; and waste is billed against the entire industry.

A. C. and D. C. machines, ranging from approximately thirty-six inches in diameter up to ponderous 40,000-kv-a. water-wheel generators are built of welded steel plates and structural shapes. The all-welded 165,000 kw. Hell Gate generator, the most powerful turbo-unit in the

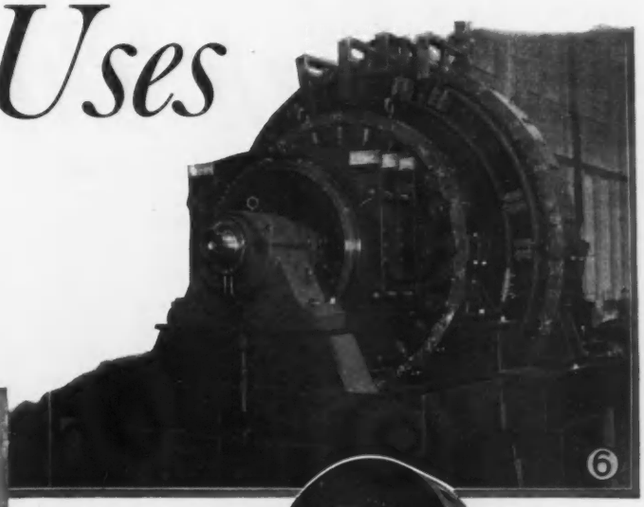


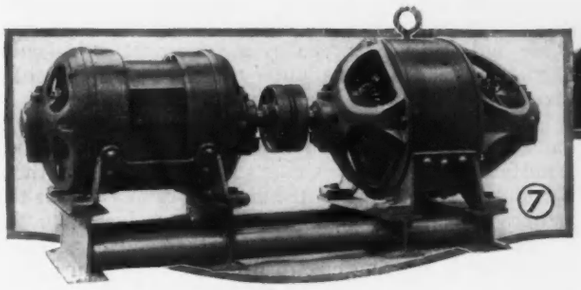


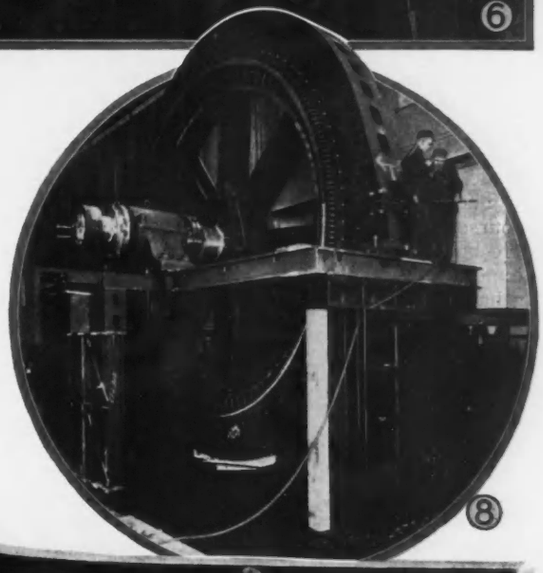
SOME examples of the uses of arc welding in the electrical industry are: 1. *Assembling brackets for bearing supports on a vertical water-wheel generator.* 2. *An example of welded construction in a motor-generator bed-plate, with mounting for an exciter.* 3. *A welder at work on a large rotor that is built up.* 4. *A welded synchronous motor.* 5. *The method employed in assembling a stator for an A. C. generator*

BOTH alternating and direct current machines, ranging in size from 36 inches in diameter up to 40,000-kv-a. water-wheel generators, are built up of welded steel plates and structural shapes. Building electrical apparatus from steel shapes, bars and plates practically eliminates the use of patterns and at the same time reduces machining operations to a minimum, thereby effecting many economies in their construction. The greatest saving is derived in the case of large machines that are seldom duplicated, for which full-size wooden models are made by hand, that are used once and then destroyed or stored at heavy expense, awaiting a call that may never come

Industry Uses Extensively





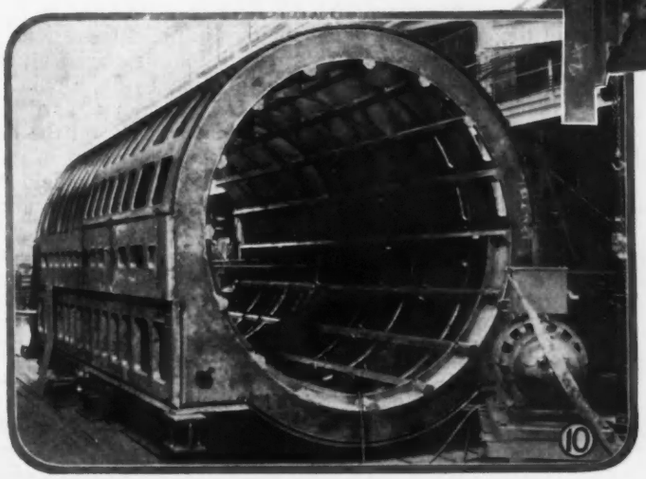


world and just now going into service in New York City, is startling testimony of manufacturing confidence in electrically welded machinery.

Making and storing patterns is expensive. Getting rid of patterns by using welding saves money, time and hand labor for the manufacturer. The saving is greatest in the case of large machines which are seldom duplicated for which a full size wooden model is tediously made by hand, used once, and then destroyed, or is stored at heavy expense awaiting a call which may never come.

When a casting is made the size of the sections is determined largely by the ability of the pattern-maker to make a pattern, the core-maker to make a core and the foundry to produce sound castings which will not crack under shrinkage. In the welded design each section is selected only for the strength required, instead of making the parts from two to five times oversize to meet foundry limitations.

Building machinery from fabricated rolled steel shapes, bars and plates, instead of castings, means a great deal less machining because the machine is built from a semi-finished product. It is much more simple in construction and is easier to fabricate.



OTHER applications of arc welded construction: 6. Common practice in the building of motor-generator sets by the arc welding process. Notice the simplicity of the bed-plate construction. 7. A heavy rolled steel frame and structural steel bed-plate as used in a 13,000-ampere booster rotary converter for the Commonwealth Edison Company, Chicago. 8. This 5000-hp. welded steel synchronous motor was built for a steel mill drive. 9. The operator shown in this illustration is welding the frame of a 40,000-kv-a. water-wheel generator. 10. An example of what is being accomplished in the way of building 100,000-kv-a. turbo-generators. Many other uses are being made of electric welding in the industry aside from its use in constructing power generating equipment and electric motors

With the Editors

New Leadership in Nema

UNDER the guidance of a new president and a new managing director, as well as a new board of governors, the National Electrical Manufacturers Association enters its fourth year. At the annual meeting in Washington in October, Clarence L. Collens was elected to succeed H. B. Crouse as president, and A. W. Berresford was appointed to succeed Alfred E. Waller as managing director.

In a sense Mr. Collens is not a new leader at all. For three years he has been vice-president in charge of the Policy Division of Nema. To his wise leadership is due in no small measure the progress that Nema has made during that time. His election is an honor well won. It is to be expected that Nema will continue to forge ahead as it has during the past year under the leadership of the retiring president, Mr. Crouse.

The new managing director, Mr. Berresford, is of course very much in the industry spotlight at the moment. He brings to his new executive position many years of experience in electrical industrial enterprises. He has a broad background of electrical engineering knowledge and contacts, all of which should prove to be invaluable assets to him in his new work. He has the best wishes of countless acquaintances and friends as he takes up his new duties.

Throughout the membership of Nema, and even among non-members, the news of Mr. Waller's resignation was received with regret. For three years he labored incessantly, at times literally night and day, to reach the goals which he had set for Nema and which Nema had set for itself. No future executive in the same position will display a greater loyalty to the ideals of the organization nor a greater devotion to his work in it than did Mr. Waller. It is simple truth to say that he must be thought of as one of the founders of Nema. He has been a constructive force in welding together the organizations which three years ago came together to form the present association. Mr. Waller has not announced his plans for his future, but no matter what he does nor where he goes he will retain the warm friendship of electrical manufacturers who worked with him during his managing directorship of Nema.

Thus, on the shoulders of Mr. Collens and Mr. Berresford falls the responsibility for carrying on the work of those who have gone before them. In the words of Mr. Crouse, the big problems before the manufacturing branch of the electrical industry are to consolidate and make effective in greater measure the present Nema organization, to develop markets, and to accomplish effective cooperation with other branches of the industry.

"Hang Together or Hang Separately"

ONE need not travel far nowadays to hear loud and frequent protests by electrical manufacturers over the demands that are made on them for financial support by electrical organizations of all kinds scattered in all parts of the country. And sometimes the request for money comes from an electrical organization in behalf of organizations not electrical in character.

Recently one manufacturer voiced a three-part complaint against such solicitation.

He had been "pushed" for a contribution for a local electrical league in a distant city, one in which his company does little business.

He had been repeatedly solicited for a contribution to finance a Light's Golden Jubilee celebration in another town in his state, and the amount wanted exceeded the amount that he had contributed toward the Golden Jubilee celebration in his own home town.

He had also been urged by an electrical organization to make a certain contribution toward the support of a grand opera company located in a distant city.

Protests of this kind will continue, and solicitations of the kind in question will continue, until the electrical manufacturers themselves take some means to stop them. Certainly, other groups in the industry cannot handle this matter. When the manufacturers themselves take this matter seriously enough to get together and to agree on a plan for supporting electrical organizations on a basis that is fair to all concerned, the problem will be solved, but not until then.

Ownership of Dies for Molded Products

ELECTRICAL manufacturers in increasing number each year are incorporating molded parts into their products, until today the manufacture of molded parts is no small industry in itself. In this development a practice has grown up which is now demanding thoughtful consideration. It seems to be the universal practice for the makers of molded parts to design and build the dies for these parts and then to keep the dies, in some cases even after the manufacturer for whom the dies and parts were made has been charged for the design and construction of the dies.

One manufacturer writes as follows:

"We are going more and more into the use of molded parts in the construction of our instruments, but from lack of sufficient experience we are not entirely familiar with the making of molded parts from the manufacturing standpoint.

"From contracts we have made for special parts it seems to be the general practice for the maker of the molded part to design and make the dies at the customer's expense, retaining the dies, and in some cases collecting their cost by distributing it through several invoices. Other manufacturers charge for the dies and bill the customer, holding the dies in their possession, in some instances building them with some special features that make them usable only in the plant of the builder. This latter practice in many cases works a hardship upon the customer, as it places him entirely on the defensive in any later dealings with the maker of the molded parts. We are wondering whether it would be better practice to have such dies made by those familiar with die construction, and then retain the dies ourselves, so that we may place our orders for molded parts where we can get quantity production as well as quality production."

There are several sides to such a question. It would seem that after the dies are once paid for they should become the property of the manufacturer who had them built. On the other hand, if the dies were built by some organization not molding the product, there is always the possibility of controversy between the die-maker and

the maker of the parts, possibly over faulty or inefficient construction.

Of course, there are several types of equipment for the production of molded parts, but it does not seem reasonable to believe that the owners of such equipment and at the same time the makers of the dies for the parts would deliberately design dies with special features so that they could not be used in the equipment of other manufacturers of molded parts.

In any event, in view of the great strides that have been made toward standardization, here is another problem that deserves consideration. Undoubtedly equipment for molding parts for electrical apparatus could be so standardized as to accommodate dies of many different types. This might mean only the adoption of some simple method for attaching the dies to the machines, or it may make necessary the complete reconstruction of molding devices. Surely, with the ever increasing demand for molded parts and with the possibilities tending toward economy from the simplifying of such machinery, there is real necessity for study along these lines.

Defend the C. O. D. Mailing Privilege

REPORTS that the Post Office Department is considering dropping the C. O. D. mailing privilege, that is the "business reply card" and the "business reply envelope," ought to receive prompt and vigorous attention by electrical manufacturers, as well as other business concerns of all kinds. It is reported by Printers' Ink that the postal officials believe that the privilege will never reach the popularity anticipated for it by its sponsors, that tests have convinced advertisers that the new plan is not profitable, and that it is not profitable for all classes of advertisers. Apparently it does not take very long nor very much evidence to convince postal officials one way or another. From the standpoint of the thoughtful business man, the C. O. D. mailing privilege has not yet been tried out long enough to prove its value or its lack of value. And there are plenty of advertising experts, men skilled in direct mail work, who might easily show Uncle Sam a better design for the cards and envelopes, a design that might win as many friends as the present design wins enemies. At any rate, if the sales and advertising managers of electrical manufacturing concerns wish to retain this C. O. D. mailing privilege, now is the time to tell the Post Office of their wishes and to speak plainly and to the point.

Financing Market Development Work

NOW that Light's Golden Jubilee has passed into history and the National Food Preservation Program is winding up its activities, the thought of the industry again swings back to the long-planned cooperative market development campaign, the big plan that has been in preparation for more than two years by the Electrical Industry Sales Conference. Everybody knows that this activity was "soft-pedalled" this year in order to let the industry concentrate its attention on the Jubilee and Food Preservation. What's doing now? That is the question of the hour, asked by the friends of market development work. The latest word is to the effect that the final report of the E. I. S. C. is about to be approved and laid before the industry for acceptance. It is greatly to be hoped that this is true.

Manufacturers who have been watching this activity carefully are keenly interested in the methods that will be adopted to finance the sales and advertising activities to be developed under cooperative action. How much of the cost of a great cooperative activity shall be borne by the manufacturers and how much by the central stations is a question that can start a debate any time and anywhere. It is expected that the cost of any comprehensive plan will run high, and it is recognized that a large number of concerns in all branches of the industry will not voluntarily contribute to the cost of the activity even though they may be willing to admit that they would benefit by it.

In this connection the suggestion made to ELECTRICAL MANUFACTURING by a leading electrical manufacturer may be worthy of thoughtful consideration. He suggests the following plan:

"First. Let all manufacturers agree to add to each invoice to jobbers 1 per cent of the amount of each invoice. Let this amount be collected by the manufacturers and remitted at the end of the month to the Electrical Industry Sales Conference or to the Society for Electrical Development. This 1 per cent charge will be the contribution of the jobbers to the cost of the cooperative activity.

"Second. Let the manufacturers contribute at the end of each month an amount equal to that collected from the jobbers.

"Third. Let all jobbers add 1 per cent to all invoices to electrical contractors and dealers. The jobber in turn will remit the amount collected, from contractors and dealers, at the end of the month to the Electrical Industry Sales Conference or to The Society for Electrical Development.

"Fourth. Let the central stations contribute an amount equal to that received from manufactures, jobbers, and contractor-dealers, or 50 per cent of the cost of the activity. This suggestion is made in view of the fact that the power company will continue to reap monthly returns from the electrical service supplied to the appliances from which the other groups in the industry would receive only one profit."

Certainly any financial plan that is suggested will win friends and create enemies for itself. Whatever plan is finally adopted should be developed only after careful consideration of many suggestions received from all groups within the industry.

Motor Selection

IN this matter of selecting motors for electrical products is there not much more to be considered than designing the motor to suit the product or designing the product to suit the motor? May it not be possible to design the product so as to permit of a variation in the choice of motors?

One electrical manufacturer has found that it is, as is explained elsewhere in these pages under the general subject of motor selection.

In his case his product has a specific amount of work to perform. To do it this manufacturer knows that he must have a motor with high starting torque. He is little concerned with overall efficiency. Then, without limiting himself to the restrictions of a rigid drive between the motor and the product, he has the opportunity to select the type, make and size of motor best suited to his needs.

For this manufacturer this practice offers several advantages. He can purchase his motors from whom he pleases. He has the advantage of buying motors in this manner quickly, which means quick delivery to his customer. He need not carry large stocks of any sizes of motors, as he can buy them on short notice.

All in all, in following this practice, he is not limited in the design of his product. He can buy where he wants, when he wants, and in quantities to suit his needs. At the same time, he can render satisfactory and prompt delivery to his customers.

Characteristics That Determine the *Selection* of MOTORS

No. 18 of a Series Discussing Motors of Different Types

In this, the concluding instalment of this series of articles, the authors continue their discussions of elevator motors and alternating current adjustable speed brush shifting motors

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Consulting Engineer
Fairbanks, Morse & Co.

AND

C. P. ROBINSON
Synchronous Engineer
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IN THE previous instalment of this series the authors took up the discussion of the characteristics of motors and control apparatus for elevators, and this discussion is concluded here, with an explanation of the applications of alternating current adjustable speed brush shifting motors.

Elevator Motor Control—The subject of the auxiliary control apparatus for the gearless elevator motor is susceptible to considerable variation. An attempt will be made in this article simply to discuss some of the outstanding features of the control and to illustrate typical control arrangements.

Elevator control is primarily speed control. The gearless variable voltage elevator motor has been in general use for a long period of time, but it has not always had the close speed regulation that is now available. The variable voltage control system has always provided extreme flexibility of speed control, but the speed for a given point on the controller was subject to considerable variation as the load varied.

This point will be understood by referring to the shunt wound speed load curve, Figure 8. This curve shows a slightly drooping characteristic as the load increases. For a gearless elevator motor, this drooping characteristic would be very much more pronounced, due to several contributing factors. In the first place the motor is designed for a relatively slow speed, 60 to 120 r.p.m., representing average speeds, with consequently, a high armature resistance. Then the generator that supplies the voltage has an inherent drooping voltage characteristic. Also the motor that drives the generator usually has a certain amount of droop in its speed characteristic. The results of all of these factors contributed to wide speed variation of the motor itself, in the older installations, where a method of speed regulation was not used.

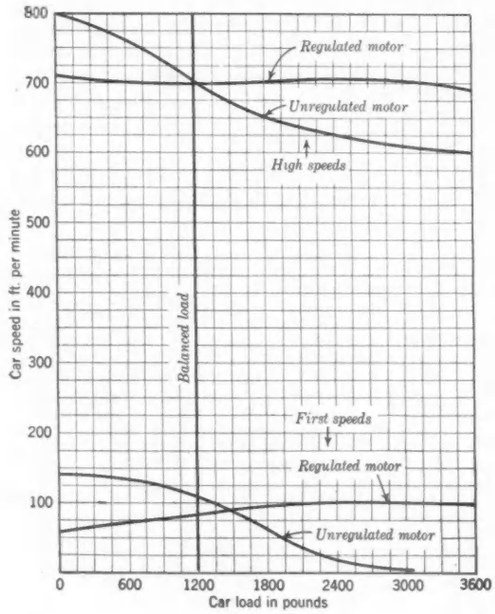


Figure 47

A chart showing speed regulation characteristics in terms of elevator travel in feet per minute, for a regulated and an unregulated motor, for one direction of travel

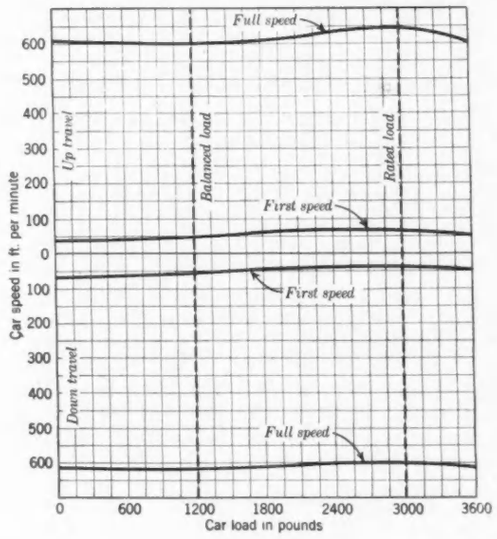


Figure 48

The speed regulation curves of a gearless elevator motor with speed regulation for both the upward and downward directions of travel. Regulation is about the same in either case

Several different methods have been used to improve the speed regulation. One quite satisfactory method is by the use of the series exciter, shown in Figure 46 attached to the main generator set. The exciter is so connected that its armature is in series with the shunt field of the main gen-

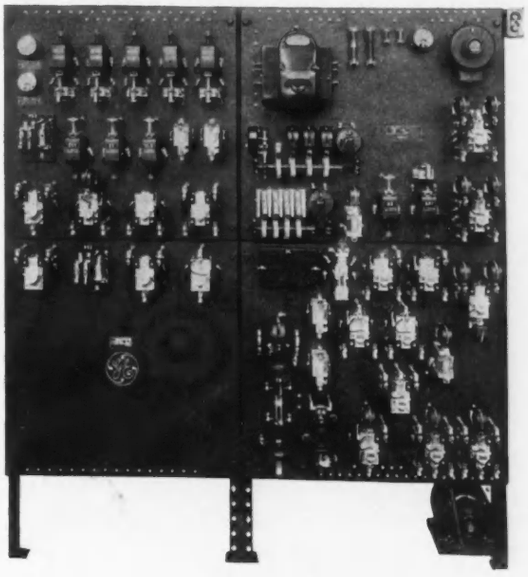


Figure 49

A special control panel in the construction of which there were incorporated a number of electrical protection features such as a hand-operated emergency switch in the elevator car

erator, and its field is in series with the armature of the generator. As the load on the generator increases and the speed of the elevator motor tends to decrease, the series exciter raises the generator voltage, thus maintaining the motor speed. In the same manner, through its connections, the exciter generates a voltage opposing overspeed of the motor.

Just what this improvement in speed regulation has meant can best be realized by referring to Figure 47 which shows the speed regulation characteristic, in terms of elevator travel, in feet per minute, for a regulated, and an unregulated elevator motor, for one direction of travel. The speed load curve is shown for the lowest point and the highest point of the controller. It will be noticed that the regulated motor provides a considerable margin of higher speed above the balanced load point. This has meant a real increase in the efficiency of gearless elevator transportation.

Figure 48 shows the speed regulation curves for a gearless elevator motor with speed regulation, for both the upward and the downward directions of travel. The regulation is approximately the same in either case.

Many gearless installations have been made employing the usual motor generator set and control switchboard, but without the refinements of speed regulation. The operation is entirely satisfactory, but it does not have the nicety of control, nor does it obtain the maximum of acceleration and speed. Such units are suitable for freight installations or where passenger service is not heavy.

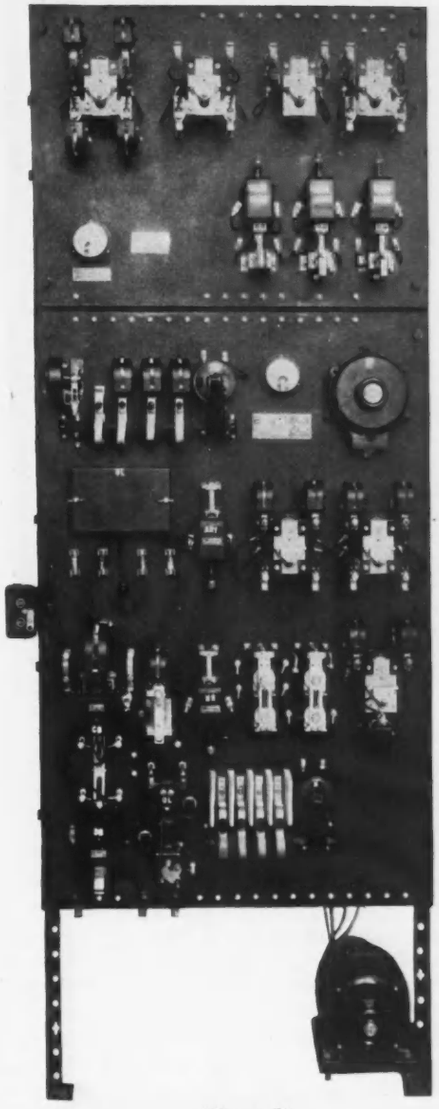


Figure 50

This type of elevator control panel includes the leveling feature, the purpose of which is to provide means to stop the elevator car at any floor and at the same time level with that floor

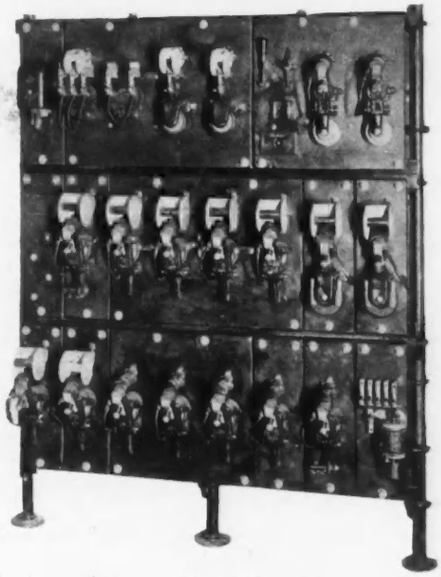


Figure 51

This is another type of control panel similar to that shown in Figure 50. *The function of all control panels is essentially the same, that is, to provide proper protection and operation*

Formerly this non-regulated type was used for all kinds of installation, but the tendency in modern installations is to use some kind of speed regulation in order to derive the maximum benefit from the elevator service.

So far we have not touched upon the control features that are incorporated in the penthouse switchboard and those pertaining to car control. This can best be done, perhaps, by simply noting typical features the average control panel usually provides.

The control panel will usually provide most of the following features:

1—Elevator motor field control
2—Overload protection

Figure 52

This is one type of elevator operator's car switch in which are included the control and various push buttons for safety, lights the door switch cut out control

3—Elevator motor field protection
4—Elevator motor brake control
5—Emergency line circuit opening
6—Emergency dynamic braking
7—Over voltage protection
8—Car control from penthouse at reduced speeds
9—Generator field reversing contactors
10—Field discharge control

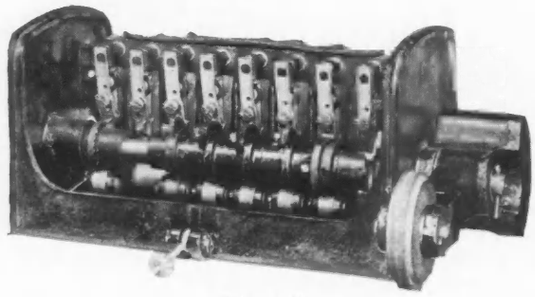


Figure 53

One type of limit switch that operates to protect the car at the end of its travel, at the bottom or top of the shaft, in case an emergency requires its operation

In addition to these incorporated features, the following electrical protective features are usually provided:

1—Hand operated emergency switch in the elevator car
2—Automatic "slow down" and "stop" at terminals
3—Emergency stop just beyond terminals, in case item (2) limit switch should fail

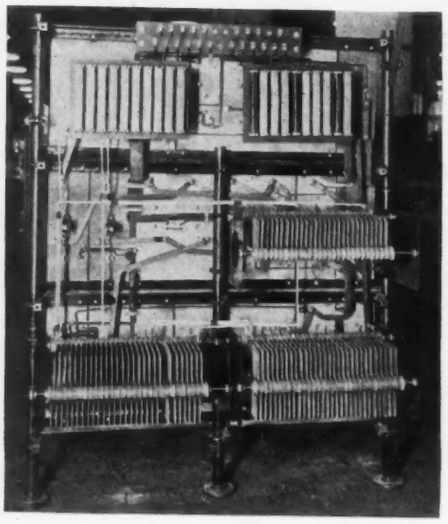


Figure 54

This is the rear view of the control panel shown in Figure 51 *showing the various resistance units that function in connection with the control apparatus*

4—Emergency stop in case of over voltage
5—Emergency stop in case of over speed
6—Emergency stop in case car rail clamps set
7—Emergency stop in case counter weight rail clamps set
8—Emergency stop if cables foul

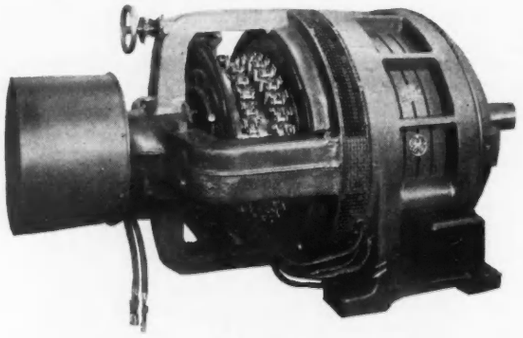


Figure 55

A typical alternating current adjustable speed brush shifting motor showing the brush gear as it is attached to the ring gears that are operated by the handwheel on the end bracket

In each case the emergency stop will usually consist of a simultaneous opening of the armature circuit and application of emergency dynamic braking, as well as a full and immediate application of the solenoid brake.

The features mentioned are characteristic of elevator control, which requires the maximum of safety and protection. As to how the various features are incorporated depends upon the particular manufacturer.

Figure 49 shows a typical control panel that incorporates the various features mentioned above.

Figure 50 shows another type of panel that includes the leveling feature, the purpose of the leveling feature being to make a positive stop at any floor level.

(*Continued on page* 68)

Characteristics of Insulating Materials for Power Cables

The Second of a Series Discussing Power Cable Manufacture

One of the most important problems confronting the electrical engineer today concerns the limitations and characteristics of cable insulating materials

By E. W. Davis
Simplex Wire & Cable Company

IN the previous instalment of this series of articles, published in the October issue of Electrical Manufacturing, the author discussed some of the problems entering into the insulation of power cables and then treated specifically the subject of rubber insulation. This discussion is continued herewith, together with an explanation of the use of varnished cambric as an insulating material. It appears that varnished cambric first came into use some twenty years ago and that as its quality was improved its use has continued to grow until today there is an ever increasing demand for power cables insulated with this material. As its name implies it is a closely woven cotton cloth, free from blisters or wrinkles and other imperfections, and coated on both sides with multiple layers of insulating varnishes.

What can be accomplished by the proper selection of rubber compounds is shown in Figure 7. Both cables have identical geometrical dimensions, yet one shows very clearly the ozone formation when laid on a grounded plate, while the other shows none at all.

Figure 8 shows rather strikingly what may happen in the crotch of a high voltage three phase cable unless precautions are taken to prevent it. For a paper insulated or varnished cambric insulated cable, the breakdown at the crotch might be delayed for some considerable time, but in a rubber cable the breakdown would be only a matter of minutes. Of course, in practice pot heads and end bells protect the crotch of the cable, but air pockets and voids formed in the filling compound may allow this ozone formation to some degree.

Figure 9 shows what actually happened in the crotch of a 25,000 volt all-rubber cable after a few days in service. This not only happened once but several times, until the cable was taken out of service. The factory test on this cable was 62,500 volts, yet it could not be kept in service at 25,000 volts due to the ozone formation in the cable crotch.

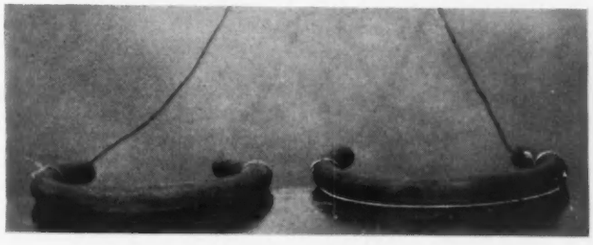


Figure 7

Here is shown what can be accomplished by the proper selection of rubber insulating compounds. Both cables have identical geometrical dimensions, yet one shows very clearly the ozone formation when laid on a grounded plate. The other shows none at all

Briefly, we may sum up the characteristics and limitations of rubber insulation used for insulation on power cables as follows: a—High resistivity and dielectric strength, b—Variable electrostatic capacity, c—Great flexibility, d—Slow water absorption, e—Quickly destroyed by ozone.

Varnished Cambric Cables—The development of varnished cambric cables covers a period of about twenty-five years. The first cables in this country were manufactured in 1902 and proved successful from the start. In 1910 the quality of the varnished cambric cloth was greatly improved by important discoveries in the art of making varnishes. Since then the demand for cables of this type has grown rapidly until today their manufacture forms an important part in the cable business.

Varnished cambric insulation consists of layers of closely woven cotton cloth, both sides of which are coated with films of insulating varnish and a viscous, moisture-repelling, non-drying filler between the layers.

The varnished cambric cloth, as the name implies, is a closely woven cotton cloth free from blisters, wrinkles or other imperfections, and coated on both sides with multiple layers of an insulating varnish. The minimum number of coats on each side of the cloth is three for cloth thicker than 7 mils and two coats for 7 mils and thinner.

Varnished cambric cloth is tested before application to a cable for various essential electrical and physical properties, as follows:

Electrical Properties:
- Insulation Resistance
- Electrostatic Capacity
- Dielectric Strength

Physical Properties:
- Thickness (variation)
- Weight-lbs. per sq. yd.
- Tensile Strength
- Tear
- Effect of Heat and Oil

The maximum and minimum limits that each cable manufacturer allows for acceptable cloth depends entirely upon the method of test. Various organizations (such as The American Society for Testing Materials, the Insulated

Power Cable Engineers Association, the American Engineering Standards Committee, etc.) are attempting to standardize methods and apparatus for testing varnished cambric cloth which will be a real indication of the quality of the materials used.

The varnished cambric is applied to the conductors in the form of helically wound tapes. The tapes are wound on with a slight lap, and of such widths that they will lie smoothly and be as free from wrinkles as possible. The joints in successive layers are staggered and usually every two or three layers are reversed in direction.

A compound is applied between the layers of varnished cambric so as to exclude, as far as practicable, air and

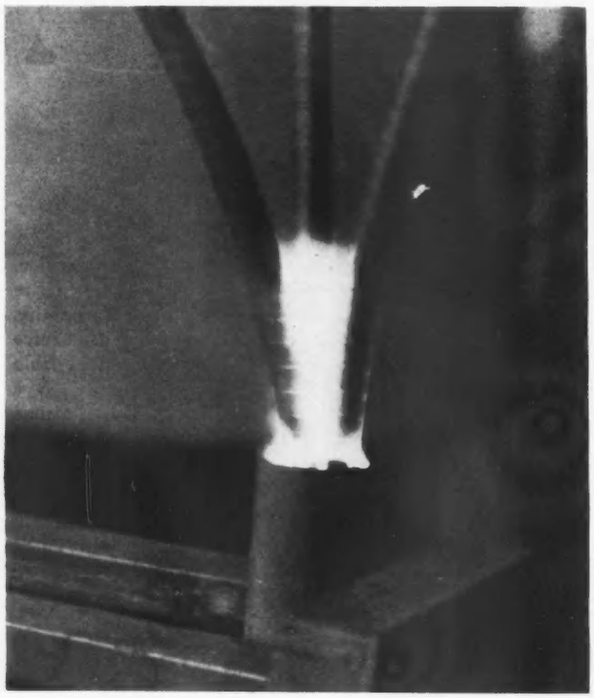


Figure 8

This shows what may happen in the crotch of a high-voltage, three-phase cable unless precautions are taken to prevent it. With a paper insulated or varnished cambric insulated cable the breakdown at the crotch might be delayed for some considerable time, but with a rubber cable the breakdown would only be a matter of minutes

moisture and forms with the varnished cambric a firm, semi-flexible wall of insulation. The compound is a viscous non-hardening one of slow-drying characteristics and of such a nature as to have no deleterious effect on the varnished cambric or conductor. Where the cable is to be used for a vertical run such as "risers" in buildings, a minimum amount of compound is desirable.

For cables consisting of more than one conductor (except for concentric cable or flat twin cable), the separately insulated conductors are cabled together with a suitable lay and the interstices filled with a sufficient number of saturated jute laterals or other approved material to give the completed cable a cylindrical cross-section. Over the cabled conductors there is usually applied a belt of varnished cambric insulation, put on in the same manner as in the case of the individual conductors. In case there is no belt, a suitable binder tape is placed over the cabled conductors.

Varnished cambric cables are manufactured for a variety of uses and are furnished with weatherproof or flameproof braids, lead covered, lead covered and wire armored or lead covered and steel taped, or rubber jacketed with steel tape as aerial cable.

When flameproof braided cables are specified, the outer braid or braids are of closely woven cotton or asbestos yarn thoroughly impregnated with a flameproof material usually of a white or a slate color. Flameproof or burning tests are specified to insure the use of proper material. Weatherproof braided cables are covered with a close woven braid or braids completely saturated with weatherproof compound and finished with a waxy material to give a smooth outside surface and to exclude as far as practicable all moisture.

For leaded cables, there is formed over the insulated cable a closely fitting sheath of commercially pure virgin lead or, in the case of aerial cable, an alloy of lead and tin or antimony. The sheath is of suitable thickness for the size of cable underneath.

Each length of cable before shpiment and, in many cases, after important steps in the manufacture, is subjected to electric tests for dielectric strength, insulation resistance and dielectric loss or power factor. Braided cables are usually tested after a short immersion of water while lead cables are tested dry from copper to sheath. In some cases of braided cables with thin walls, it is not considered good practice to make immersion tests. In such cases, short samples are tested wrapped in metal foil.

The insulation resistance is measured at low voltage in most cases after an electrification of one minute, and is expressed in Megohms per 1000 ft. corrected to a standard temperature of 60 deg. Fahr. (15.5 deg. C.).

In the case of multiple conductor cables, the insulation resistance of each conductor is measured from each conductor to all the other conductors in multiple with the sheath or ground.

When required, special tests are made on short samples, such as bending tests, ultimate dielectric strength tests before and after bending, and similar tests.

Figure 9

This is what actually happened to the crotch of a 25,000-volt all-rubber insulated cable after a few days in service. It not only occurred once but several times, until the cable was taken out of service. The factory test on this cable was actually 62,500 volts, yet it could not be kept in service at 25,000 volts because of the ozone formation in the crotch. Notice how the insulation on all three cables has failed completely

Some of the common uses for varnished cambric cables are listed below:

High and low voltage underground transmission
High and low voltage submarine transmission
Switchboard wiring
Power house and station wiring
Transformer and oil switch leads.

Repossessing Electrical Products

What Are Your Rights?

What Should You Watch?

IN the majority of instances the decisions rendered by the higher courts against the sellers of electrical devices can be traced to a lack of legal knowledge on the part of the seller. This effect may result because, through insufficient legal knowledge or unreliable information, the thing or act resulting in the litigation was improperly performed, or the act which may have effected a condition resulting in a favorable verdict was not done.

For these reasons the sellers of electrical devices should become familiar with their legal rights and liabilities. In this manner acts likely to result in litigation can be prevented and frequently certain things done properly at the right time and place may result in a favorable verdict, although the legal controversy cannot be avoided.

Probably the most common source of litigation arises from the sale of electrical equipment under contracts by the terms of which the seller endeavors to retain ownership to the merchandise with the right to repossess it if the purchaser fails to pay the agreed purchase price.

The first important thing, when controversy over a contract develops, is to determine whether or not the agreement is valid and binding. Of course, if the contract is invalid and unenforceable neither party is liable for failure to fulfill the terms of the agreement.

Frequently, it is difficult to determine whether a transaction is a mortgage or a sale. Generally, the distinction between a sale of merchandise and a mortgage of such property is that the former is a transfer of the absolute title therein for a definite price, whereas a mortgage is at most a conveyance of property as security for the payment of a debt.

A general test to be applied is: If the transfer is intended merely to secure an existing indebtedness it is a mortgage; but if the debt is extinguished, or if the money advanced is not by way of a loan, and the seller merely has the privilege of refunding if he pleases and thereby entitling himself to a reconveyance, the transaction is a conditional sale, and not an absolute sale.

A conditional contract of sale gives the seller the right to repossess the merchandise, if the purchaser refuses to meet the payment obligations provided in the agreement.

It is important to know that, while valid provisions in a conditional contract of sale are enforceable between the contracting parties, in many instances such provisions are not effective with respect to third persons.

It Is Important to Know

A CONTRACT is invalid unless all of the following conditions are present:

1. Neither party must have deceived, misrepresented, or exerted unlawful influence with respect to the other party to obtain the contract;

2. Both parties must have agreed absolutely to perform a definite act or thing;

3. One party submits an offer which the other party unconditionally accepts;

4. Both parties must have been of legal age and sound mind when the contract was made;

5. Both parties must have had proper authority to make the contract;

6. The objects of the contract must be lawful and not against public policy;

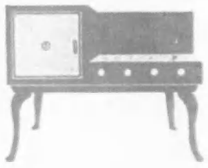
7. The law is well established that either party may legally cancel any contract obtained by the other as a result of direct or indirect fraud, misrepresentation, coercion, undue influence, duress, threats, or where the contract is made without proper authority of the purchaser's employee, or while an authorized purchaser is mentally deficient, intoxicated, under influence of drugs, or under age.

By LEO T. PARKER
Attorney at Law

For instance, an electrical company which sells an appliance and installs it in a house, may make a valid agreement, with respect to the purchaser, which entitles the seller to remove the appliance if the buyer refuses to pay for it. However, if the thing sold is a legal "fixture" and a third person holds a mortgage on the house, the latter may prevent removal of the fixture from the building, irrespective of the agreement between the contracting parties. Also, the same rule applies to tenants to whom electrical appliances are sold.

On the other hand, if the thing sold is not a legal fixture but a chattel, no one can prevent the seller from removing it from the building if the purchaser breaches the conditions of the contract of sale.

For example, in Madfes vs. Beverly Development Corporation, 166 N. E. 787, it was disclosed that a seller sold to the owner of an apartment building several electric stoves under an agreement which permitted the former to remove the stoves from the building if the purchaser failed to meet the agreed payments therefor. Each stove was attached by a simple coupling to the service line which delivered current to the various apartments. Thereafter the owner of the building executed and delivered another mortgage upon the apartment house.



When the owner of the building failed to pay for the stoves, in accordance with the terms of the agreement, the seller of the stoves attempted to remove them from the house and the holder of the mortgage filed legal proceedings to prevent the removal on the contention that the stoves were legal fixtures. However, the court held the seller entitled to remove the stoves, stating the following important law.

"Certain chattels have such a determinate character as movables that they remain personal property, after their annexation to real estate, independently of any agreement between the owner of the chattels and the owner of the realty which so provides . . . . . Other chattels, such as the brick, stone, and plaster, placed in the walls of a building, notwithstanding an agreement to the contrary, conclusively become real estate after annexation thereto . . . . This doctrine was that it is not 'where the subject of annexation is such that . . . . . where the property could not be removed without practically destroying it, or where it or part of it is essential to the support of that to which it is attached' . . . . . Gas ranges, independently of an agreement to that end between buyer and seller, retain their character as personalty, after annexation . . . . According to our view of the evidence, these ranges were not so 'attached' to the building that, as matter of law, they became part of it."

Also, in Electric Shop vs. Corey-Scheffel Co., 13 S. W. (2d) 1009, it was disclosed that a company sold electric stoves to the owner of a building, after a mortgage on the real property was properly recorded, under a contract that the seller retained title to the ranges until the purchase money should be paid. This contract was a legal chattel mortgage and was properly recorded.

Later a mechanic's lien was filed against the building and litigation developed whether the seller of the stoves was entitled to remove them from the building to secure the unpaid purchase price.

It is interesting to observe that the court held the seller entitled to remove the stoves, because they are not legal fixtures.

Therefore, it is quite apparent that any personal property placed in a house, in such a manner that its removal will not damage the building, can be removed by a seller or other person who retains a chattel mortgage on the article, although a mortgage or other lien is recorded on the real property.

Sometimes considerable controversy results in the fact that removal of electrical devices will mar the building. It is important to know that the fact that the removal will slightly mar the building is not positive evidence that the equipment is a legal fixture.

For example, in Reno Electrical Works vs. Ward, 274 Pac. 196, it was disclosed that a purchaser of twenty electric fans attached them to the walls of a leased building by brackets. Litigation developed when the landlord objected to removal of the fans because the brackets were nailed and screwed to the walls. However, the court held the fans attached in this manner to the building not legal fixtures, saying:

"It is true the insulating material was secured to the walls of the building by screws and nails, but not so secured as that the fans and materials can not be removed without injury to the insulation, and also the building."

In the case of De Charette's Guardian vs. Bank of Shelbyville, 291 S. W. 1054, it was held that a cream separator and electric generator are personal property to the extent that they do not become fixtures in a building to the floor of which they are bolted. The owner of the building contended that the electrical device was permanently affixed to the real property and, therefore, was a part of it, for which reason the manufacturer was not legally entitled to remove it for the unpaid purchase price.

However, the court held the equipment personal property and removable from the building by its unpaid owner and explained the law on the subject, as follows:

"The cream separator and generator were bolted down with three-eighths inch bolts, and, too, were easily removable without damage to the premises. In determining whether fixtures are in law immovable or not, there are, as the parties to this appeal agree, three general tests: first, annexation to the realty, either actual or constructive. Secondly, adaptation or application to the use or purpose to which that part of the realty to which it is connected is appropriated. Thirdly, intention to make the article a permanent accession to the freehold."

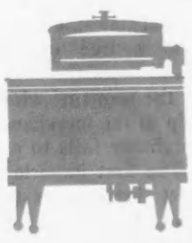
The law is well established that a seller of electrical equipment is not entitled to repossess it when the contract gives title to the purchaser.

In other words, a valid straight contract of sale may not be changed to a conditional contract of sale simply because the contract is worded to accomplish this purpose.

For illustration, in the recent case of Grapico Bottling Works vs. Carbonic Co., 113 So. 454, a buyer and seller signed a contract which purported on its face to be a lease, but which was held to be a sale. By its terms the buyer agreed to lease from the seller for the term of twelve months an electrical machine. The buyer was to pay a total rental of $4,500, the first payment of $450 at once and the balance was to be paid in equal installments.

In holding the contract a valid contract of absolute sale, the court explained the law, as follows:

"The contract, though couched in the phraseology of a lease, is in fact a sale. It contains the essentials of a sale, to wit a fixed price, which was the rental to be paid, a thing to be conveyed at the price fixed.



An Acid Resistance Test of Varnish Films

By H. J. Graham
Westinghouse Electric & Mfg. Co.

ELECTRICAL apparatus intended for use in places where destructive chemical fumes may be present, must be protected by the use of acid-resisting treatments. In selecting the varnish for such applications, a test which will give consistent results in a reasonable time is demanded. The large number of insulating varnishes and protective coatings on the market makes the time element of the test an important factor.

The present method of determining acid resistance by coating ½-in brass rods (round on the end) with the varnish and immersing in a 10 per cent solution of acid has not given consistent results and the time limit was excessive. Accordingly, various methods have been considered and tried and the method outlined herewith has given consistent results with a satisfactory time factor.

Specimens were prepared by dipping pieces of Kraft paper about 20 cm. (7.87 in.) wide, 25 cm. (9.8 in.) long and about 0.063 mm. (0.0025 in.) thick into various varnishes at the consistency required to give a film thickness on a copper test strip of 0.022 mm. (0.0009 in.) to 0.026 mm. (0.001 in.) (This is the consistency as used for the drying time test in accordance with ASTM Serial Designation D 115).

The specimens were drained till dripping ceased and baked at 108-112 deg. C. for a period three times the length of the drying time of the varnish. The specimens were given a second treatment of the varnish, drained and baked as before, but in the reverse direction to obtain a uniform coat.

The final thickness of the specimen was held between 0.132 mm. (0.0052 in.) and 0.162 mm. (0.0064 in.).

The specimens were cut into pieces 8 cm. (3.15 in.) square. One piece was clamped between two hollow rubber cells.

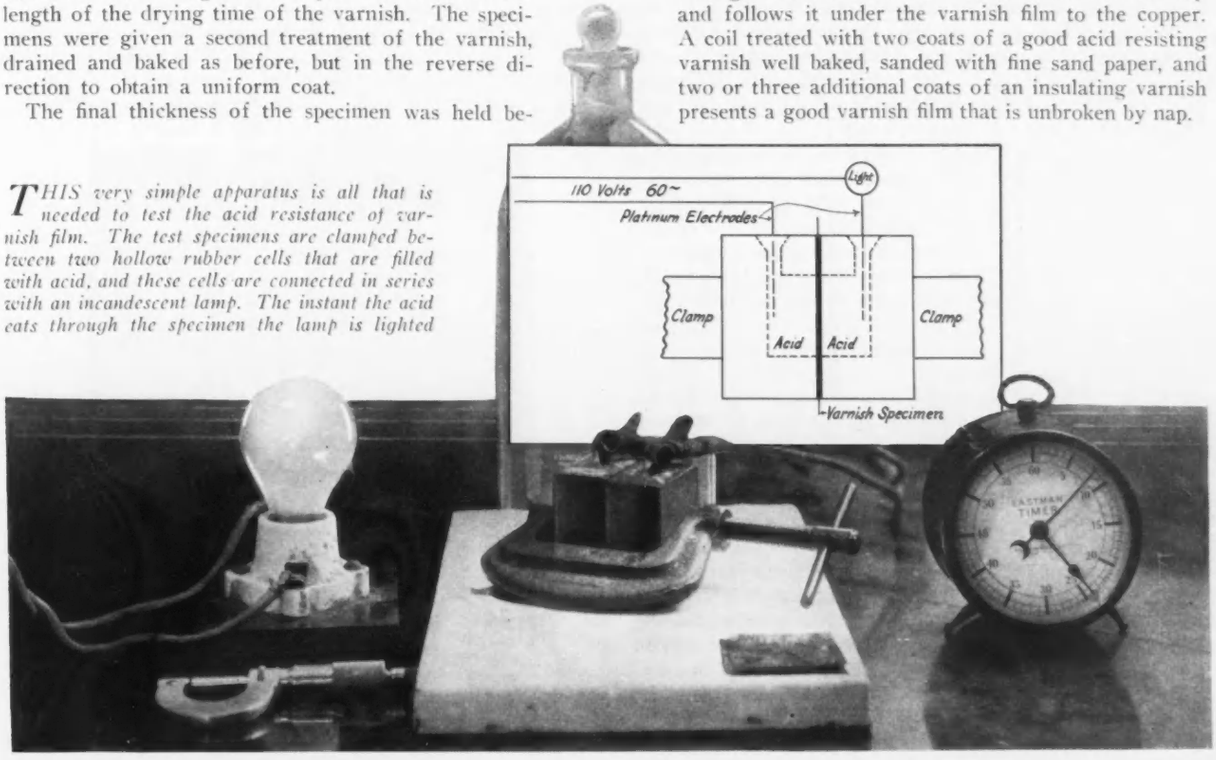
The blocks were filled with concentrated acid and connected in series with a light. The instant the acid had eaten through the specimen, was indicated by the lighting of the light.

The following varnishes were tested: A—Black baking plastic, B—Black baking, C—Black air-drying, D—Clear baking, E—Clear air-drying.

It was found from these tests that Varnish A (black baking plastic) is superior to the other varnishes in resisting the nitric acid, while it is a close second to Varnish B (black baking) in resisting sulphuric acid. The asphaltum (black) varnishes are superior to the clears in acid resistance.

Specimens tested with concentrated hydrochloric acid and sodium hydroxide failed to break down in 48 hours. Sulphuric acid and nitric acid attack varnish films readily as compared to hydrochloric acid and sodium hydroxide.

Cotton taped coils treated in an insulating varnish as above has little acid resistance due to the nap from the cotton tape. The nap in some cases can be seen extending through the varnish film. The acid attacks the nap and follows it under the varnish film to the copper. A coil treated with two coats of a good acid resisting varnish well baked, sanded with fine sand paper, and two or three additional coats of an insulating varnish presents a good varnish film that is unbroken by nap.



THIS very simple apparatus is all that is needed to test the acid resistance of varnish film. The test specimens are clamped between two hollow rubber cells that are filled with acid, and these cells are connected in series with an incandescent lamp. The instant the acid eats through the specimen the lamp is lighted

Porcelain Enamel—Its Uses in the Electrical Industry

No. 20 of a Series of Articles on Common Materials

Vitreous enamel finishes have attained an important position in the electrical industry because of their appearance and easy cleaning properties

By William Crawford Hirsch

PORCELAIN or vitreous enamel finishes have attained an important position in the electrical industry chiefly because of the spotless and easily cleaned surface which they provide for many domestic appliances, such as electrical ranges and refrigerators, clothes washers and ironers, dishwashers, and numerous other electrical kitchen accessories. Sundry products, such as electrical kitchen clocks, are porcelain-enameled to match in appearance the appliances mentioned. With ceramists making available a steadily widening range of colors and decorative effects in porcelain enamels, the field of application of these finishes is being extended to many appliances other than those intended for the kitchen, but which are subject to a good deal of handling and finger-marking.

Porcelain-enamels result from applying vitreous materials to metal surfaces under heat, fusion being the objective. It is furnace treatment through which the vitreous finishing material becomes fused with the surface of the metal that distinguishes this process from those frequently referred to as enameling and consisting of the spraying on of nitrocellulose and kindred lacquers. A porcelain enamel becomes as much part of the (metal) body as does the glaze on a piece of chinaware or porcelain.

The enameler's raw materials are essentially those of the potter and glass maker—feldspar, clay, sand, flint, fluorspar, soda ash, borax, etc. Bearing this in mind and also that the enameler's furnace is merely another form of the potter's kiln and the glassmaker's pot furnace, the strictly ceramic character of vitreous enamels will be easily understood. One might say that vitreous enameling is the procedure followed by the potter in the glazing of his ware, modified so that the glaze fits metal instead of a clay body.

Supervision of the porcelain-enameling process calls for highly specialized knowledge, a combination of ceramist and metallurgist plus the intuition of the empiric. For that reason, even some of the large users of porcelain enamels in the electrical and other industries prefer to give their work under contract to a jobbing enameler. Specialization finds further expression in the enameling industry itself, many enamelers buying their "frit," by which name the enameling mixture or batch is known, ready prepared from compounders who smelt and mill this material, the incorporation of color oxides in the siliceous mass calling for special skill aside, of course, from the advantages of mass production of these "frits."

As in all finishing operations, the cleaning and preparation of the ware for the enameling process is of paramount influence on the final results obtained. In addition to the ordinary precautions taken in other finishing processes, such as electroplating, to insure strictly clean surfaces, the enameler must overcome by special means the obstacles which the natural structure of some metal surfaces present. So for instance, a good deal of cast iron has to be enameled by a special process in which the metal is heated in furnaces at 1200 to 1750 deg., and then lifted with tongs into a receptacle containing the dry enamel which fuses with the surface of the red-hot castings. This is known as the dry process, no water being used in the preparation of the enamel. While it is also used at times in the enameling of small parts because it tends to eliminate drying marks that must be guarded against in the more generally used wet process, dry process enamels are not considered as offering the same resistance to chipping, crazing and impact as do wet process enamels. Machining of the enameling surface of castings makes possible good results by the ordinary wet process.

Preparatory cleaning is both mechanical and chemical. Cast iron parts are sand-blasted either in steel-lined compartments or in barrel type mechanisms, depending largely upon size. In some cases, the parts are "scaled," heat being

Electric ranges lend themselves to the use of porcelain or vitreous enamel finishes, thereby enhancing the appearance of the product

applied to rid the surface of oils and greases as well as to relieve strains and stresses set up during the preceding fabricating processes, such as pressing, stamping, etc. Nearly all ware is "pickled" in a sulphuric or hydrochloric acid bath, traveling in containers, known as "baskets" through a series of tanks. When it emerges from the final rinse tank, it goes to a dryer.

Enameling batches or "frits," covering a wide range of compounds which vary according to the ware to be enameled, whether they are for ground or cover coat, and the particular enameling method to be used, are prepared in pebble mills which grind the material in the presence of water to required grain size. The batch, silicates, alkalis, together with opacifying and coloring agents as well as chemical salts to keep the material in proper suspension, is mixed preceding the milling, this mixing being either manual or mechanical. Batch formulas are looked upon as highly valuable by enamelers and in many cases much pains is taken to guard their secrecy. The closest control is exercised to insure that no deviations from the formula occur in compounding, scales which can be set and locked being used.

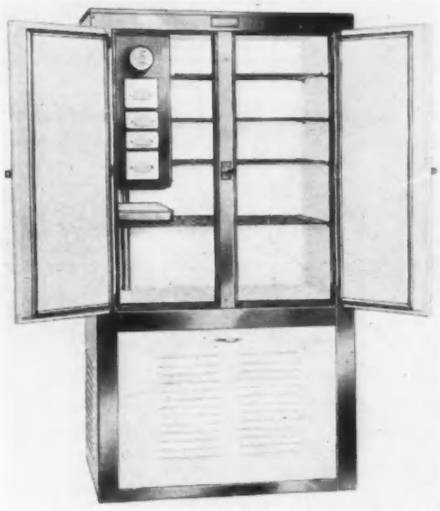
The principal methods of applying enamel are dipping, spraying, and slushing. The first named method is used for applying ground coats, tanks containing the enameling fluid being sufficiently large to immerse the ware. Larger pieces, such as electrical refrigerator cabinets are rolled through the dipping tanks. Much of the success of the enameling process depends upon the skill of the dipper who can make or mar the uniformity and consistency of the enamel coating.

Spraying is carried out by means of spray guns in spray booths containing a turntable on which the piece to be sprayed is placed. These spray booths are equipped with exhaust outlets and receptacles to conserve the enamel waste which is later reclaimed.

Slushing is dipping in another form. In dipping the enamel is so diluted with water that it will drain off the ware, while in slushing, the enamel is put on so thick that the excess must be shaken off.

Before the ware goes to the furnace, all surplus enamel is removed with brushes.

Decorative effects are obtained by using rollers, stencils, or decalcomania. Graining in imitation of natural woods is carried out with rollers, one of which is equipped with the grain design while another carries the ink. Stencils permit of the application of intricate designs in as many colors as desired. Decalcomania, much used for placing trade-marks and company names on electrical ranges and refrigerators is applied by means of sizing, and after the surplus paper has been removed, the decalcomania is burned in at a relatively low temperature—about 500 deg. F.



Electric refrigerators are products that are also finished with porcelain enamel, making them very easy to maintain in a sanitary condition

Electric furnaces are rapidly displacing oil or coal fired furnaces in enameling. The electric furnace permits of the closest control of temperatures, supplies a more penetrating heat than do furnaces of other types, and obviates the possibility of spoilage of the product by fuel smudge. Considerable skill is required to place ware in a furnace efficiently. During the firing oxidizing conditions must be maintained, so that the oxides contained in the batch are not converted into uncombined metals which would discolor the product instead of giving it the desired color. Burning temperatures range from 1,150 to 1,800 deg. F. Higher temperatures and longer burning are required for ground than for cover coats.

Cover coats, of which there may be one or two, known as first and second finish coats, must fuse into the ground coat, just as the latter must become an inseparable part of the metal itself. This calls for some very pretty problems in harmonizing differences in coefficients of expansion. The enameler must take into consideration, in the compounding of his materials, not only the thickness and characteristics of the metal to be enameled, but also the properties of every coat that he superimposes on another. Cover coats are usually burned at temperatures of 100 deg. below those called for by ground coats.

The subject of colors in enameled products is a complex one. Aside from the sensitiveness of many of the metallic derivatives which are used as colors in enameling, numerous other factors determine the shade or tint which the finished product will have. A coarse ground frit will yield a different shade than a fine ground one, although the raw materials may be identical. The silicates used in the batch have a direct influence on the effect of the coloring ingredients. Firing temperatures and firing methods affect color. It is, therefore, little wonder that once a color has been achieved that meets with good demand, the greatest care is taken not to vary by so much as a hair's breadth from the batch formula, the preparation of the material, and the burning of the ware.

Only a brief summary of the many colors that are available is possible. Cobalt yields a blue, but a wide range of blues and greens is obtained by compounding with chromium oxide. Cadmium and selenium yield reds. Cadmium, chromium, antimony, uranium, and silver contribute salts that give a wide range of yellows. Manganese and iron oxides furnish browns, nickel, zinc, aluminum, titanium, and zirconium being added to supply innumerable shades. Cadmium, selenium and tellurium compounds give the popular mahogany colors. Pinks are derived from chromium and tin or when cost is no obstacle, from gold. In short, the ceramic color specialist utilizes every possible source for enameling colors, and then blends and blends until there is virtually no shade or hue that can not be obtained in enamel finishes. Some highly artistic enamel finishes have recently come on the market, such as perfect imitations of Italian marble, the veins of the stone being reproduced with striking faithfulness.

Like so many other processes, enameling under the stimulus of mass production is emerging from rule-of-thumb methods to scientific control. Mechanical refinements and short cuts are being introduced with a view to lessening costs, and specialists are beginning to turn their attention to devising the most suitable enamel finish for those appliances which are improved by having a porcelain enamel finish.

The author desires to acknowledge his thanks to the Editors of the Ceramic Products Cyclopedia and Ceramic Industry for much of the material in this article.

Characteristics of Electrical Control Apparatus

A continuation of the discussion of the properties and functions of different types of electrical control equipment and their respective applications

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Cutler-Hammer Mfg. Company

THE proper application of electric control so affects its design that the application must be considered as a part of the design. Other considerations, of course, affect the choice of the motor and the control, all of which was discussed in the first instalment of this article, published in the October issue of ELECTRICAL MANUFACTURING, together with the properties and characteristics of various types and kinds of electric motors. In what follows different types of control apparatus are explained.

Number of Accelerating Contactors—The number of accelerating contactors used on an automatic starter depends on the load, size of the motor and on the allowable peaks. If the load at starting is light, less accelerating contactors are necessary, because with a given resistance in series, the motor will reach a higher speed.

Small motors have a comparatively high resistance which assists in holding down the peaks of current and in this way allows the use of a smaller number of accelerating contactors.

The allowable peaks are usually higher on small motors because the total energy drawn by the motor is a small percentage of the capacity of the system. On larger motors the peaks are limited in order to cause as little line disturbance as possible.

More accelerating contactors are, in general, used on direct current than on alternating current, principally because of the possibility of commutator trouble. The early d. c. motors were not designed to stand high peak currents and automatic starters for use with these motors had a comparatively high number of steps. The present tendency is to reduce the number of steps. Figure 3 shows the relation of peak currents with various number of contactors.

Most of the textbooks on motors give very complete data on what happens in the motor circuits after the motor is running at rated speed. But very few writers devote much space to the conditions set up in the various circuits while a motor is getting up to speed.

Figure 4 shows what happens in a motor circuit while it is being accelerated to speed. This represents a slip-ring induction motor.

The abscissa give value of current in per cent of full load vertically, and speed, horizontally. On the right is shown the first current inrush with the motor at rest. As the motor accelerates, the current drops along the speed current curve corresponding to the value of resistor in circuit. If

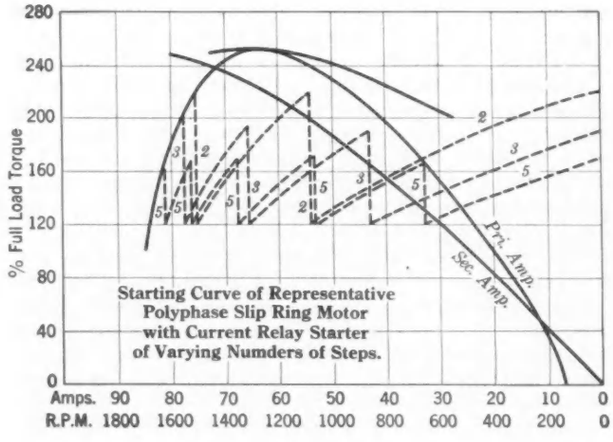


Figure 3

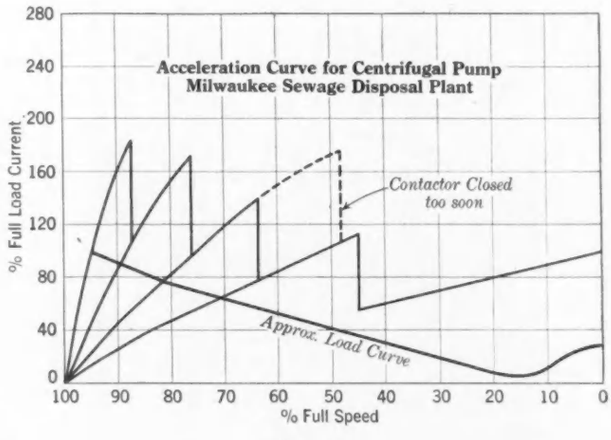


Figure 4

Figure 3 shows the relation of peak currents with a number of contactors, and Figure 4 shows what happens in a motor circuit while it is being accelerated to speed. Text-books give very complete data about what happens in a motor circuit after the motor is running at speed, but few of them devote much space to what happens while a motor is reaching operating speed

allowed to drop far enough, this current will reach a stationary value where the speed current curve intersects the load speed curve. If an accelerating contactor closes, a new current inrush is obtained and the motor is now operating on a new speed current curve and the current drops as before. Automatic control is designed so that the relays operate slightly above the load curve. This is done because if current limit accelerators are calibrated to operate too close to the load curve, a slight increase in the total load may cause the accelerators to hang open.

This also illustrates what may happen through improper handling of a manual starter. If a step is cut out too soon, the current peak rises, but because the motor speed is now lower, the peak is excessive.

Application of control covers such a wide field that an analysis of functions is helpful.

Considering motors, the control duties are:

Starting
Stopping
(a) Coasting
(b) Quick safety
Reversing
Plugging
Speed regulating
Protection against overload and no voltage.

These functions are found grouped in a wide variety of combinations. Because contactors and relays play such an important part in the makeup of control, a brief analysis of their uses may be of value.

A magnetic contactor may be defined as a device for opening and closing an electric circuit through electromagnetic means. Usually the actuating circuit is separate from the controlled circuit, and the energy required by the actuating circuit is much less than that handled by the contactor. A contactor is used in a control device for one or more of the following reasons:

Automatic or "Self Starter" Functions—1—The controller is required to function automatically upon the actuation of some primary control or "pilot" device. In this case, magnetic contactors represent the simplest and most direct way of handling the main circuit, since the forces developed by the pilot device (float switch, pressure gage, limit switch, manual master, etc.) are too small to operate the main contacts directly.

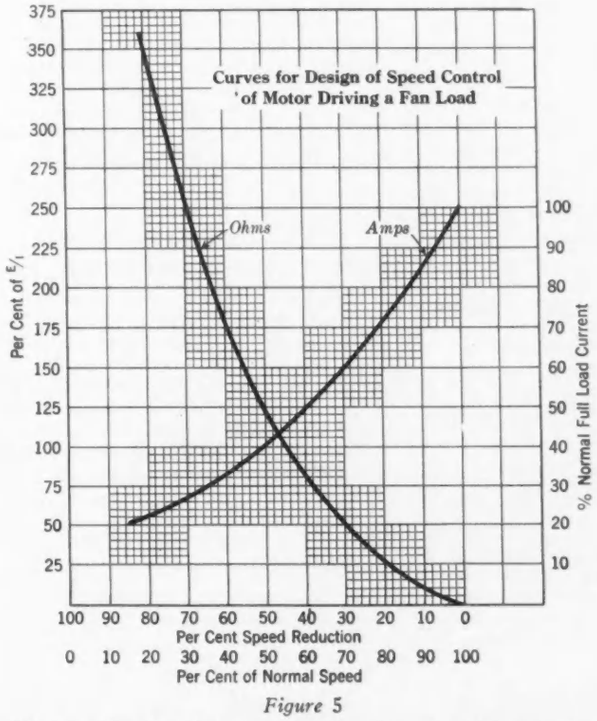

Curves for Design of Speed Control of Motor Driving a Fan Load
Ohms
Amps
Per Cent of E/I
% Normal Full Load Current
Per Cent Speed Reduction
Per Cent of Normal Speed

Figure 5

Here are the operating characteristics of a motor driving a fan. It will be noticed that the current drops off very rapidly as the addition of ohms reduces the speed of the motor

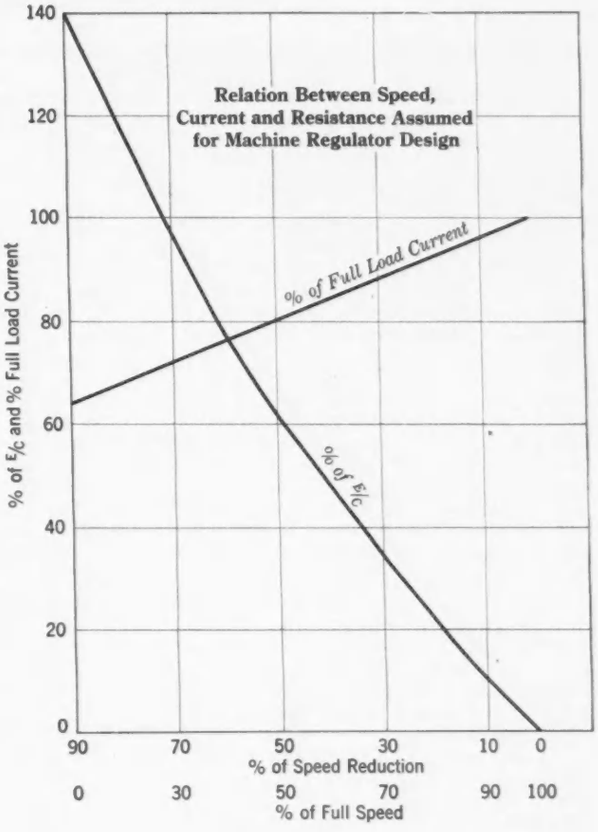

Relation Between Speed, Current and Resistance Assumed for Machine Regulator Design
% of Full Load Current
% of E/C
% of E/C and % Full Load Current
% of Speed Reduction
% of Full Speed

Figure 6

In this chart there are shown the curves for the relation between speed, current and the resistance assumed for machine regulator design. The chart shows specifically how the load varies

Wiring-Saving Function—2—The distance from the point of control to the main circuits to be controlled may be too great to allow carrying these circuits directly to that point. In this case the pilot device may be automatic, that is, it may function in response to changes in some physical quantity, such as pressure in a pipe, height of water in a tank, temperature, etc., or it may be manually operated.

Labor-Saving and Safety—3—The main currents may be too large or of too high voltage to handle directly by either automatic or manually operated switching devices. It is usually impossible to design automatic switching devices such as float switches, pressure regulators, thermostats, etc., which will handle anything but a very limited amount of current without making the apparatus excessively bulky. There is also a fairly definite limit to the number and ratings of circuits which can be manipulated by an operator without too much exertion. The question of safety to the operator also arises on circuits of high voltage. The use of magnetic contactors removes all of these limitations.

Selection of Electrical Conditions—4—The operation of the contactor may be required to depend on variations in the electrical conditions in the circuit controlled. Series lockout contactors, for instance, operate to close their main circuit when the current passing through them has fallen to a predetermined point. Other "relays" or small con-

(*Continued on page* 64)

Facts, Figures and Trends

Statistical information of value to electrical manufacturers in working out policies and plans for production and marketing

Telephone Industry Shows Expansion

Figures recently released by the Census Bureau on its quinquennial census of telephones show 18,522,767 telephones in the United States on Dec. 31, 1927, an increase of 29.1 per cent since 1922. The number of telephones in every State had increased, the largest increases being for Florida, 103.7 per cent; California, 57.9 per cent; Louisiana, 57.5 per cent, and New Jersey, 56.3 per cent.

In the same period the industry's investment in plant and equipment grew from $2,205,183,000 to $3,548,874,000, a gain of 60.9 per cent. The single-wire mileage increased since 1922 by 71.3 per cent, amounting in 1927 to 63,836,182. The number of employees increased by but 20.3 per cent since 1922, while the number of calls handled in 1927 showed an increase of 28.3 per cent over 1922.

Analysis of Distribution of Electric Power

Eliminating those public utility enterprises in this country whose output is devoted entirely to railway use, 10 per cent of the output of the remainder is sold for domestic service; 7.5 per cent for commercial lighting; 56 per cent for commercial power; and 6.5 per cent for traction; 3.5 per cent is used by the companies themselves in their gas, water or traction departments and for lighting companies' offices, etc.; 16.5 per cent is lost or unaccounted for.

Use of Electricity in the Home

In 1918 the average household in this country used 272 kw-hr. of electrical energy per year, but this has steadily increased. In 1920 the figure was 349 kw-hr.; in 1922, 359; in 1924, 378; in 1926, 404; and in 1928, 459, an increase of nearly 70 per cent for the ten-year period. At the same time, the average price of residential electric service has declined from 8.3 cents per kilowatt hour in 1918 to 6.55 cents in 1928.

Electric Flatiron Most Popular in Homes

At the end of 1928 there were approximately 19,077,000 homes in the United States using electric service. The National Electric Light Association estimates that there were 14,500,000 flatirons in regular use in those homes during 1928, as compared to 5,800,000 vacuum cleaners; 4,250,000 washing machines, and 4,165,000 electric fans. There were, in addition, 2,270,000 toasters; 2,565,000 radio sets; 1,750,000 percolators; 1,300,000 space heaters; 720,000 electric refrigerators; 675,000 ranges; 400,000 oil burners; 350,000 sewing machines, and 300,000 ironing machines. It should be noted that these figures do not include the total number in homes, but those estimated to be in regular use. The total cost of current for these appliances in regular use per year amounts to approximately $190,928,000.

Census of Manufacturers Compared

In 1925, 187,224 establishments reported to the Bureau of the Census in the Biennial Census of Manufactures. Comparable figures for the 1927 census showed 191,080 establishments. The number of wage-earners in 1925 was 8,381,511, and in 1927 the comparable figure was 8,343,089. Wages were, respectively, $10,727,338,000 and $10,839,295,000. The value of production for these establishments amounted to $62,668,260,000 in 1925, while comparable figures for 1927 were $62,165,236,000. Values added by manufacture were, respectively, $26,771,373,000 and $27,487,054,000, according to the National Industrial Conference Board.

Refrigeration Sales Figures to Be Collected

The Electrical Division of the Bureau of Foreign and Domestic Commerce has undertaken, at the request and with the cooperation of the National Electrical Manufacturers Association, to collect dealers' sales figures on electrical refrigeration sales. As a preliminary step complete data on units made by each company, listed in their respective sizes by ratings of cubic content, dairy coolers, ice cream cabinets and water coolers, will be sought from member companies of the association, who are stated to include approximately 70 per cent of the industry's production.

British Iron and Steel Output

The proportion of iron and steel produced in Great Britain since the war has declined in comparison to total world output, according to a survey of the British iron and steel industry just made public by the Department of Commerce. In 1913 Great Britain produced 13 per cent of the total world production of pig iron, amounting to 77,710,000 tons, while in 1927 her share had dropped to less than 9 per cent. In 1913 the output of British steel mills accounted for about 10 per cent of world production of 74,680,000 tons; in 1927 world production had increased to 98,900,000 tons, of which Great Britain's share was approximately 9 per cent.

Use of Radio Telephone on Trains in Italy

The Societa Italiana Telefoni Interurbani has requested and obtained permission to carry out experiments concerning radio telephone communication on trains in Italy. They have been furnished with a railway carriage which they are fitting up with the necessary equipment for experimenting on the run between Turin and Milan. If the results are satisfactory it is possible that the government will go more deeply into the matter, but at present even the cost of so equipping the carriage in question is being borne by the telephone company.

Employment Is Higher

According to the Department of Labor, factory employment is running 6 per cent ahead of last year, with payrolls averaging 11 per cent higher. Of 23 major classifications of industry studied, only four showed reductions of working forces.

Building Expenditures in 302 Cities

Total expenditures for new buildings in 302 cities in the United States with a population of 25,000 and over totaled $3,089,075,192 in 1928, a decrease of 4.7 per cent as compared to the 1927 figure of $3,240,441,134. In these cities, $1,908,321,876 was expended for residential buildings in 1928, as compared to $1,961,899,529 the year before, a decrease of 2.7 per cent. Non-residential buildings decreased 7.6 per cent, the 1927 figure being $1,278,541,605, and the 1928 figure $1,180,753,316.

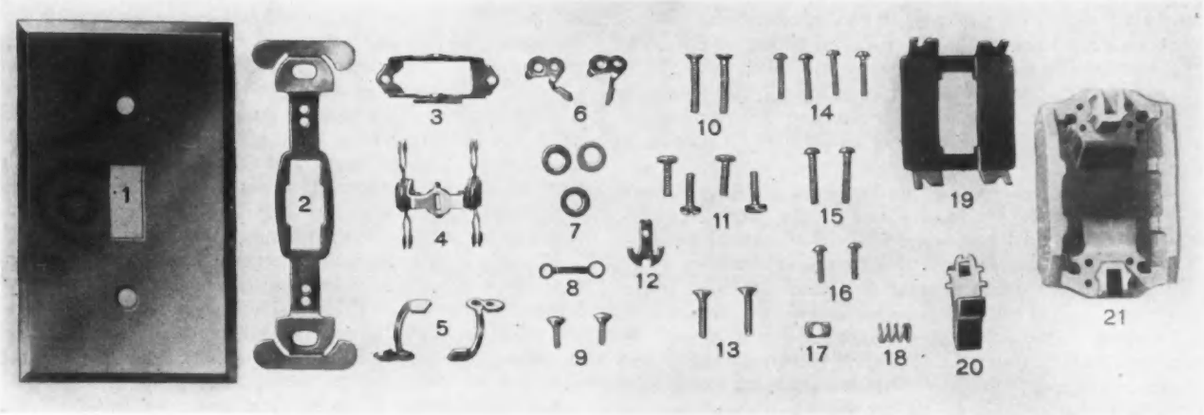
Electric Refrigerators in Singapore

Plans have matured for the construction of a new seven-story hotel in Singapore, to be erected in the near future. It is believed that this will offer an opportunity to manufacturers of equipment, such as ceiling fans and electrical kitchen equipment, especially electrical refrigerators. Inquiries should be addressed to Alkaff & Co., 70 Alkaff Arcade, Singapore, S. S.

The Large Investment in Radio

At the present time the radio industry has $235,000,000 invested in plant facilities for manufacturing and broadcasting, and employs 110,000 people to manufacture and distribute radio sets and to handle broadcast programs. Annual payrolls total $210,000,000, and gross retail sales of radio sets and equipment total $650,550,000, according to figures reported recently.

Double Pole Electric Toggle Switch Components



The illustration above shows the different parts entering into the construction of double-pole toggle switches, while the table below lists the various materials from which these parts are made. It will be noticed that these consist principally of steel, brass, fibre insulation and porcelain

Table of Parts and Raw Materials Used in Toggle Switches

Part No.	Title	Material	Part No.	Title	Material
1	Plate	Steel	12	Spring retainer	Brass
2	Hanger	Steel	13	Screws	Brass
3	Bracket	Brass	14	Screws	Brass
4	Contacts	Brass and copper	15	Screws	Brass
5	Contacts	Brass	16	Screws	Brass
6	Contacts	Brass	17	Spring retainer	Brass
7	Washers	Brass	18	Spring	Steel
8	Connecter	Brass	19	Iusulating cover	Fibre
9	Screws	Brass	20	Handle	Brass and rubber
10	Screws	Brass	21	Base	Porcelain
11	Screws	Brass			

Spray Finishing Fundamentals

(*Continued from page* 36)

the other hand, many of the cheaper paints contain and employ gasoline, naphtha and similar solvent materials, all of which are more volatile than the lacquer solvents commonly employed.

When the spray method began to be used on a wide or quantity production scale, much discussion was started. Due principally to the facts that lacquers have a nitro cellulose content and that there was at that time a lack of adequate research or criterion regarding its fire hazard qualities, lacquer came under a volley of undue criticism and, in many instances, unwise and unjust regulation. To quote the National Fire Prevention Association: "There has hardly been a commercial product so generally misunderstood as pyroxylin lacquer. Many misleading articles concerning it and the hazard of its use have appeared in the technical and trade press. It is now developing that pyroxylin has been heavily and erronously penalized. The most important development is the general recognition today that pyroxylin lacquer is no more inherently dangerous than is any other paint, lacquer or varnish and not as dangerous as the cheaper varieties."

Lacquer, ready to apply contains pigments, resins and flexible oils, thinner or solvent and nitro-cellulose, the latter averaging about 12 per cent of the total content. The solvents or thinners are in the alcohol class and vary considerably. They include alcohol, amyl acetate, tuloil and various other hydro carbons too numerous to mention. The nitro-cellulose used in pyroxylin lacquer, in one stage of its manufacture, is pure nitrated cotton and as such would be explosive if allowed to dry, but it changes its nature and loses this characteristic just as soon as it is dissolved in a solvent, hence a can of lacquer is no more explosive than a can of paint or any other finishing material.

It is highly appreciated that such a thoroughly competent and adequate organization as the National Fire Prevention Association should publish their findings concerning lacquers and lacquer enamels. It will do much to erase many of the old superstitions and condemnations held concerning this material.

Mergers Become the Vogue

(*Continued from page 23*)

entertainment. So rapidly is both radio and the show business in general evoluting that the corporation no sooner finishes one step in its development than a new invention throws open a whole new wilderness for development.

When R. C. A. first became active, it was largely in the equipment field. The next move was the production of receiving sets. To sell sets, it was necessary to provide regular air programs for the owners of the sets. Hence the National Broadcasting Company was taken over and its chain was increased. For awhile it looked as though the public was going to get its entertainment, its education, its exercise, its religion by listening to a radio speaker at its fireside.

Then came the "talkies." Radio had a serious rival. If it wished to retain the good graces of the public, R. C. A. saw that it would have to get into the theatrical business. So the Keith-Albee-Orpheum Corporation, with its string of vaudeville houses, was bought. Other theatrical chains were acquired. The R. C. A. Photophone, Inc., was started as another subsidiary. The Photophone is a device for synchronization of sound and motion pictures. The Victor Talking Machine Company was absorbed, as there is a valuable tie-up between the talkies and phonograph records. As a result of all this activity, R. C. A. is already one of the Big Four in the theatrical world. The other three are Fox, Warner Brothers and Paramount.

R. C. A. Furnishes An Excellent Example

THE RADIO CORPORATION OF AMERICA has furnished us with a splendid demonstration of the benefits of the merger. In a field such as this where things are moving with such lightning-like speed, there isn't time to start a business from scratch. It is infinitely more practical to go out and buy a business that has already staked out a homestead in the wilderness that is being thrown open for development.

General Motors is another dominant corporation that arrived where it is mainly via the merger route. And now that General Motors has definitely entered the electrical business we may expect to see it pursue the same methods that it has so successfully used in the automotive field. In fact, it made its entrance into the electrical field when it took over the Delco Light business several years ago. It landed in the electrical game with both feet when the Frigidaire refrigerator was developed as a by-product of Delco.

Some of the automotive equipment organizations which General Motors control, such as Remy, are essentially electrical manufacturers. General Motors has a 22 per cent interest in Bendix Aviation Corporation, and Bendix, in turn, "holds" a number of electrical outfits, such as Delco Aviation Corp., Eclipse Aviation Corp., Pioneer Instrument Company. The word "aviation" in some of these names is unfortunate, as their lines are not necessarily confined to aviation. The Eclipse Aviation Corp., for example, makes portable radio sets, generators for radios and other electrical goods.

Heretofore, however, General Motors association with the electrical business, with the exception of its Frigidaire and Delco lighting activities, has been in connection with devices used either with automobiles or airplanes. General Motor's latest move has been to step into the radio end of the electrical industry. A few weeks ago it absorbed the Day-Fan Electric Company, of Dayton, Ohio, a large radio set manufacturer. It is the plan to operate Day-Fan as a unit of General Motors.

And toward the middle of October the formation of the General Motors Radio Corporation was announced. The shares of this company are owned by General Motors, Radio Corporation, General Electric and Westinghouse. It is the intention of the company to make radios for use in automobiles and presumably to make regular radio sets. A joint statement, issued at the time the news of this company came out, by Alfred P. Sloan, Jr., president of General Motors, and David Sarnoff, executive vice-president of Radio Corporation, was as follows: "Not only do we believe that there is a great opportunity for the development of the radio business as an adjunct to the automobile, but the radio field in general is one that is closely related to the automobile and electric appliance business in which the General Motors is engaged.

"The Radio Corporation of America will continue independently, as heretofore, both as to the manufacture and distribution of its products, and the General Motors Radio Corporation will develop its business along separate lines. The Radio Corporation and the General Motors Corporation will cooperate to make the new arrangement a success."

There is a lot more behind General Motors' latest expansion move than this statement would indicate. General Motors is determined to diversify, to get so many irons in the fire that it will not be dependent on any one industry, no matter how profitable that industry may be for the moment.

Another business is not so good as it used to be. Not a very large percentage of car dealers are making money. Thousands of them are barely breaking even. A horde of them are not even doing that. Car dealers need other things to sell—volume-makers that will pull down overhead and that will provide a means of evening out the seasonal peaks and valleys in automobile retailing. General Motors appears to have decided to supply its dealers with other things to sell. It intends to diversify their business as well as its own.

Of course, there have been other mergers in the electrical field besides those I have mentioned—many of them. However, I have confined my analysis to the principal electrical consolidations, mainly because these particular combines exemplify the most wholesome phase of the merger movement. Neither have I touched on mergers in the public utility field, where the movement is rampant.

What have these electrical mergers accomplished? Most of them are of too recent an origin to permit an answer to this question at this time. A merger must be given years to "set" before it is possible to tell whether it is a success or a failure. Those electrical mergers that have had a chance to weather the years have, for the most part, amply justified themselves. Some of them, such as the General Electric Company, have been gloriously successful.

Considering the mergers in all lines of business that have been organized in the last forty years, about one-third of them have been successful. Generally speaking, those mergers that were soundly organized and that had a real excuse for existence came through in fine shape. On the other hand, most of the consolidations that were thrown together as promotion enterprises fell by the wayside.

Electrical Control Apparatus

(*Continued from page 61*)

tactors are designed to respond to lowering or raising of voltage to a definite value. Still other relays called overloads, function when the current rises above a certain point.

Timing Function—5—A contactor may be used to secure a definite sequence or timing in the manipulation of circuits in the controller. Contactors of this kind are usually equipped with mechanical timing mechanisms such as dashpots, but the time interval may also be secured by peculiarities in the electrical design of the contactor.

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These functions have led to the development of the following general lines of contactors. (In this list some devices are called contactors and others relays, in accordance with common practice):

1—Shunt Contactors
2—Series Lockout Contactors
3—Series Accelerating Relays
4—Load or Jamming Relays
5—Timing Relays
6—Overload Relays
7—Voltage Relays
8—Vibrating Field Relays
9—Phase-Failure and Phase-Reverse Relays.

The various components of any control are carefully studied in the assembly, to insure proper location of arcing parts, short lengths of the heavy copper, etc. Template layouts are valuable aids in visualizing the appearance of the completed control. The selection of contactors is largely a matter of the proper knowledge of their ratings, as well as knowledge of the service to be met. One device may be especially good for carrying its rated current for long periods of time without operation, and another device may be particularly adapted to handling this same load when it is interrupted frequently, but not suitable for high loads on continuous duty.

The selection of relays is, of course, a subject in itself, and, as pointed out, there are large quantities of special purpose relays available for different services.

Main Circuit Resistances Are Important

MAIN circuit resistances are quite important as component parts of the control. What happens with the motor circuit during starting has been discussed. If part of the starter resistance is retained in circuit, it is interesting to study the regulating characteristics.

Assuming a direct current compound motor with armature resistance in circuit, the speed for any resistor value is dependent upon the load. The same is true of wound rotor induction motors with resistor in the secondary. Because the load at any point affects the speed, with such regulators, it is essential that the speeds at different loads be known. The most convenient form in which this relation can be expressed is a curve between load and speed for the specific application. This is commonly called a load curve. Two main divisions of the types of load are recognized, and in all ordinary cases the load can be considered to fall into one of these two classes and the representative curve for that class used. In special cases or where highly accurate regulation is required, actual load curves are used.

The two divisions are sometimes called "fan type" and "machine type," or "constant torque" loads. Under fan load we find centrifugal pumps, induced and forced draft fans, ventilating fans, etc. The load on these in horsepower varies approximately as the cube of the speed.

Figure 5 shows what happens on a fan load, expressing the load in current. It will be noticed that the current drops off very rapidly as the addition of ohms reduces the speed. Knowing that the voltage across the resistor is proportional to the speed reduction, and knowing the current, the ohms required to produce any speed can be computed. This is shown on the left hand curve. This curve is in terms of per cent of E/I where I is the full load current. It will be noted that for a speed of 20 per cent of normal, a resistor of 350 per cent of E/I is required.

The second division, machine load, covers applications like conveyors, many calenders, and rubber mills, where the torque is constant and the horsepower varies with the speed. Figure 6 shows how the load varies. The examples given seldom use armature resistor regulation, and more common applications are positive displacement blowers and reciprocating pumps.

Rubber calenders often fall midway between machine and fan duty because, as the speed is dropped on certain operations, the amount of rubber handled does not drop in the same ratio as the speed. A very good example of machine type regulators is found in rubber calenders which run at a speed below normal for threading in. Here, a fairly accurate knowledge of the load is essential, because the value in ohms must be great enough to decrease the speed as desired on 230 volts, but small enough to provide starting torque on 115 volts.

Motor Repair Organization

(*Continued from page* 43)

where the wire passes through tubes in the floor directly to the winding machines. Considerable time and labor is saved by this practice and at all times the various spools of wire are where they belong, in the store department.

When a job is finished it again passes to the test floor for final inspection, after which it moves to the shipping floor for loading into trucks.

All finished work is carefully cleaned and painted before it leaves the shop and when necessary is properly crated for shipment.

Mention should be made of the fact that a heavy duty freight elevator connects with all four floors of the building and that a dumbwaiter is available for handling small parts to or from the stock room. These have their advantages in that it is not necessary for any employee to leave the first floor of the shop for repair parts as these are placed on either of the two elevators by storeroom attendants as needed.

Careful consideration of the foregoing brief explanation of work schedules and the previously published floor plans of the motor repair shop of the J. & H. Electric Company will show that the work is systematically carried out; that all needed facilities are available and that the shop is arranged to produce the best in workmanship at the lowest possible cost.

In the third and concluding installment of this group of articles an explanation of the methods of supervision in the J. & H. shop will be given together with a description of different cost-keeping forms and their uses.

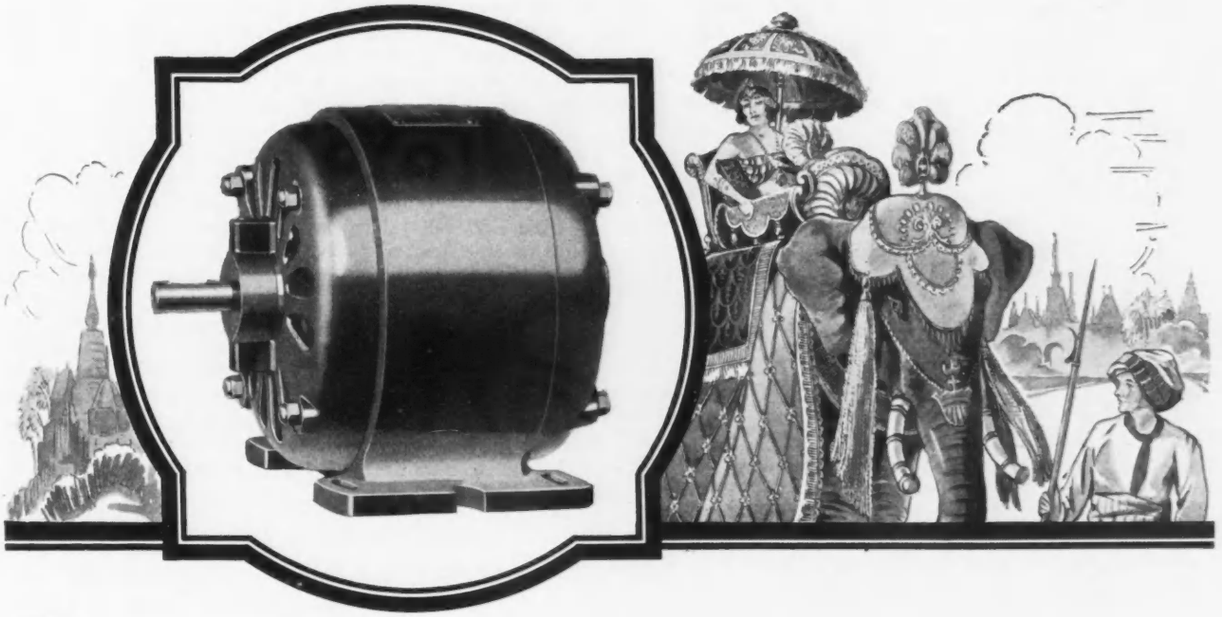
What's Really Behind Accident Control

AS C. W. Berquist of the Western Electric Company pointed out in an address before the recent convention of the National Safety Council, "there once was a time when closer attention was paid to the machines and tools than to the men who operated or used them.

"Naturally under such conditions discontent arose which finally culminated in the acknowledgment that labor is not a commodity that can be bought and sold over the counter, but that the laborer is worthy of his hire and must be treated accordingly.

"Today our industrial leaders are more concerned in men than in machines. And where the employees find that their interests come first in the minds of the management there you will find cooperation a success.

"My experience has convinced me than a man who is off his stride physically, who is worried or who obviously is carrying a burden which he will not share with anybody is not a competent workman. He is not a contented workman. He is not a safe workman. It therefore becomes necessary to afford relief and satisfactory solutions for the personal problems of the workmen. If this is done you have the essential elements for accident control."



Service counts—

It's service you buy no matter what the product. The initial price is high or low *only* if measured in terms of the service the product renders.

Fractional horse-power Motors are no exception. Ohio Motors always have commanded a higher price. The fact that they are standard equipment on so many of the finest Motor driven machines and appliances is one way to indicate the reliable performance of these Motors.

The reason for both initial price and reliable performance lies in the careful selection of raw materials; in the expert workmanship and tested accuracy of each individual part of every complete Motor. Custom built most fittingly expresses these details of Ohio Manufacturing Methods.

No matter how severe the service, Ohio Motors will measure up to the high reputation they have gained among a wide list of diversified users.

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OHIO reliable MOTORS

OHIO MOTORS

Motor Characteristics

Continued from page 52

Figure 51 shows a still different type of panel. The function of all control panels however different in construction is essentially the same; namely, to provide proper protection and operation as outlined above.

Figure 52 shows one type of operator's car switch.

Figure 53 shows one type of limit switch that operates to protect the car at the end of its travel, at the bottom or top of the shaft, in case an emergency requires it.

Figure 54 gives the rear view of the panel shown in Figure 51 and shows the various resistance units that function in connection with the control.

The illustrations given, simply indicate the general type and amount of control apparatus required. While the automatic equipment is quite complicated, nevertheless it results in a very satisfactory installation when properly adjusted.

Before concluding the discussion on direct current elevator motors, it is essential to mention the geared direct current motor drive. This type of installation may employ the same control features and perform the same duty as the gearless elevator motor. The geared motor can be much smaller in size as it can be run at a higher speed. The main objection to its use is the maintenance required. Quite often the geared motor drive is used in smaller buildings, particularly where the load is not subject to heavy peaks. The wear on gearing in such an application would not be severe and the unit could remain in service for a long period of time without interruption for repairs. Such is not apt to be the case, however, if this type of drive is used on applications where severe peak loads are encountered.

It should be mentioned that usually the motor generator set runs continuously from the time the elevator starts working in the morning until the last trip at night. Where the elevator is used sufficiently to justify having the motor generator set running continuously, the direct current gearless elevator installation is cheaper to operate than an A. C. installation.

A. C. units start frequently with a fairly heavy inrush current as compared to the current the D. C. motor takes at starting. The A. C. motors are designed on a high torque basis, for heavy starting duty, resulting in reduced efficiency under running conditions.

The D. C. motor has higher operating efficiency than the A. C. motor, but the D. C. variable voltage system has the continuous no load losses of the motor generator set, separate exciter, etc., which the A. C. motor installation does not have. The comparison upon the basis of operating costs, then, must include an analysis of the load conditions likely to be imposed upon the elevator installation.

New developments and improvements on all types of elevator motors are constantly being introduced, both electrically and mechanically. The field is large, as there are practically no buildings of appreciable size that are without elevator service. In all probability, it will be a long time yet, before the highest point of efficiency combined with economical operation for elevator service will have been reached.

A. C. Adjustable Speed Brush Shifting Motor—This type of motor has not been extensively used in this country, although there have been enough installations of motors of this type to warrant a discussion of its characteristics as compared with other types of motors. This is particularly true because this type of motor has been introduced recently into the textile and paper industries with good success.

It is altogether probable that the A. C. brush shifting motor will come into extensive use in industries of the type mentioned above, due to the fact that it is desirable to have a motor that will operate from an alternating current supply and yet have approximately the characteristics of the shunt wound adjustable speed direct current motor.

Figure 55 shows a typical motor of the A. C. adjustable speed brush shifting type. The view shows in particular the brush gear, the brushes being attached to the ring gears on either side, that are operated by the handwheel fastened on the end of the bracket. As may be seen, the brush shifting may be either manual through the use of the handwheel, or automatic through chain drive to the sprocket on the hand wheel shaft.

The speed control of this type of motor is accomplished by shifting the brushes as suggested previously.

Figure 56 shows the speed load characteristics of a brush shifting A. C. motor. The curves are shown for three different points of brush adjustment. As mentioned before, the motor has characteristics quite similar to the shunt wound D. C. motor.

These motors will develop high starting torque with low inrush and compare favorably with the 3 to 1 multi-speed induction motors. The control in this case, consisting of magnetically operated contactors is much simpler than the control for multi-speed induction motors. The brush shifting mechanism, however, becomes complicated and more or

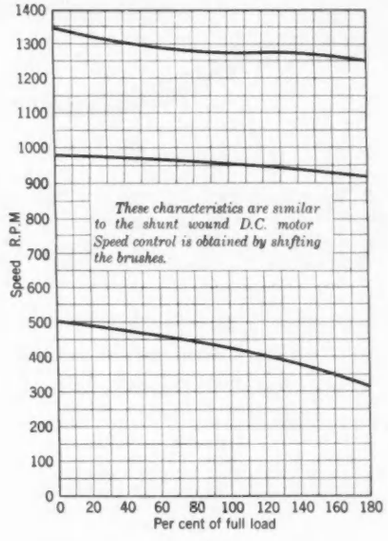

Figure 56

The speed load characteristics of a brush shifting alternating current motor. The curves show the characteristics for three different points of brush adjustment

less difficult to keep in proper adjustment; also the brush replacement item must be taken into consideration. The main advantage of this motor lies in the smooth torque changes it provides through its rated speed range. Any number of intermediate speeds, between the high and low ranges, may be obtained, and the speed regulation is exceptionally good; as good, if not better, than that obtained from the shunt wound direct current motor, without special speed regulating devices.

The intermediate speed points are obtained by simply shifting the brushes. The speed with which the brushes are shifted determines the rate at which the motor will be accelerated or retarded.

Torque changes are thus made in increments, rather than abruptly, over the accelerating period. Thus there is no abrupt change in the speed torque curve, such as is inevitable with the usual D. C. rheostatic control that cuts out blocks of resistance at each step.

The A. C. brush shifting shunt characteristic polyphase motor has been applied to the textile industry for obtaining variable speed in the spinning of yarns The use of this motor permits selecting the best operating speed over a 3 to 1 range, and has resulted in an improvement in the quality of yarn and increased production.

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—for any service requiring a precision built, fractional horsepower motor

DURING the twenty-five years in which the Dumore Company has been identified with the development of universal high speed motors a fund of experience has been accumulated — rich in technical facts and comprehensive in extent.

This fact, perhaps more than any other, has given Dumore Motors an excellent reputation in the electrical manufacturing industry. To scores of manufacturers, using fractional horsepower motors, their dependable performance and precision manufacture are known and accepted. For we bring to each individual motor problem this background of a quarter century of engineering experience.

Experience has taught the value of using none but the best materials, produced to extremely close precision standards, the need of careful assembly of parts by experienced motor builders, the advantages of dynamic balance and the concurrent freedom from vibration, excess wear and current consumption.

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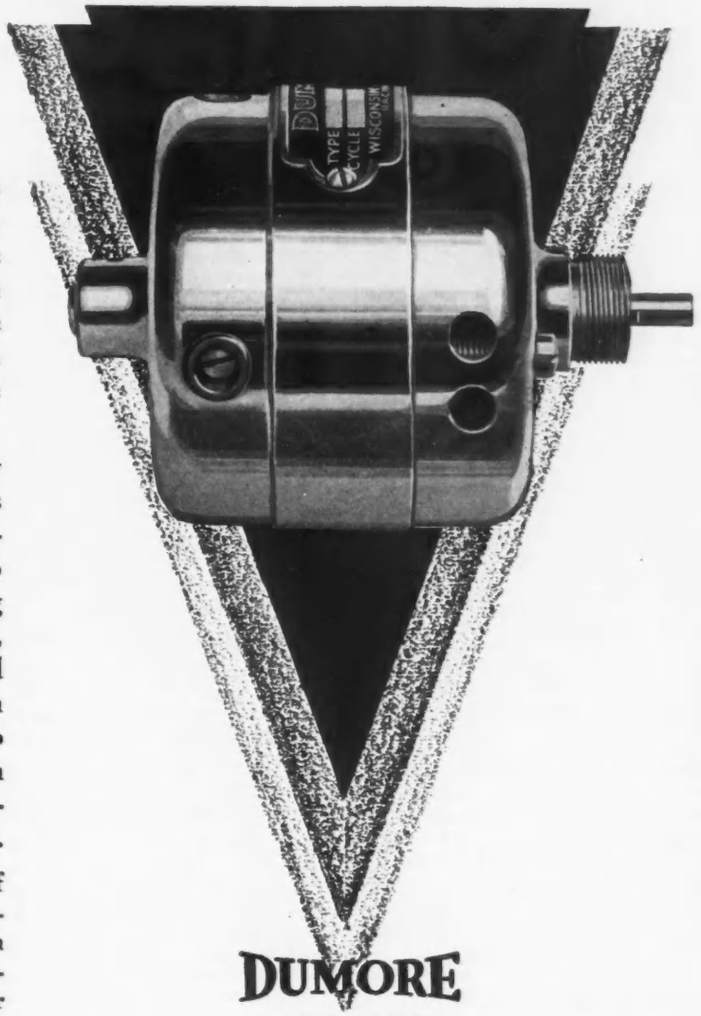

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Electrical Manufacturing News

A department containing news, and descriptions of new materials, parts and devices for the manufacture and repair of electrical products

Manufacturers Secure Radio Freight Rate Reductions

Freight rate reductions on radio products aggregating more than $1,000,000 annually, a prospective benefit to the radio public as well as the radio industry, have been secured from the carriers by the Radio Manufacturers Association traffic department. The new radio rate schedule, effecting a saving of approximately 10 per cent in annual freight bills of the radio manufacturers on radio receiving sets, combinations and loud speakers, will go into effect about Jan. 1, 1930.

In addition the carriers have granted requests to the Radio Manufacturers Association for rate reductions to the Pacific Coast which became effective Sept. 15, 1929, affecting carload shipments from Buffalo and points West, with an estimated saving per car of about $200, or a total to the industry of $500,000 annually.

After more than a year's negotiations with the joint classification committee, representing all of the principal trunk line carriers, the traffic department of the Radio Manufacturers Association, which includes every prominent manufacturer of all radio products secured the freight reductions sought. Also represented in the rate reduction applications were the national organizations of radio wholesalers and dealers, the Federated Radio Trades Association and the Radio Wholesalers Association.

The rate reduction of approximately 10 per cent applies on console receiving sets. In some cases the freight reductions, however, amount to as much as 24 per cent on table models. The new reduced schedules will virtually revise present radio rates, which were fixed when radio receiving sets were not the sturdy product of today and were more fragile and, therefore, subject to damage.

Westinghouse Launches Series of Good Will Broadcasts

Inaugurating a good-will series of radio programs dedicated to industry, the Westinghouse Electric and Manufacturing Company will endeavor to popularize America's great industries in elaborate programs weekly on a coast-to-coast broadcasting hook-up.

A series of presentations, beginning Wednesday night, Nov. 6, at 7.30 o'clock Eastern Standard time, will be known as the Westinghouse Salutes to Industry. They will be broadcast every Wednesday night on the Blue Chain of broadcasting stations, with supplementary networks, of the National Broadcasting Company heading up through WJZ, New York City.

The first of these salutes to industry was a tribute to the iron and steel industry, Wednesday evening, Nov. 6. The other tributes will include the aviation industry (Nov. 13), paper (Nov. 20), food (Nov. 27), textile (Dec. 4), electrical Christmas (Dec. 11), pumping and irrigation (Dec. 18), Christmas night electrically in the home (Dec. 25), and New Year's Night—looking forward in the electrical industry (Jan. 1).

Republic Brass Changes Name to Revere Copper & Brass

To perpetuate the name of Paul Revere in the industry which he founded in the United States in 1801, the stockholders of the Republic Brass Corporation have voted to change the name of the corporation to Revere Copper & Brass, Inc., according to an announcement by George H. Allen, president. The change in the name of the company, which operates 25 per cent of the copper, brass, and bronze rolling mill facilities in the country, becomes effective Nov. 12.

The original company founded by Paul Revere is a part of the company which will in the future perpetuate his name. This is the Taunton-New Bedford Copper Company, which is one of the six brass, copper, and bronze companies which less than a year ago were consolidated to form the Republic Brass Corporation. The others in the merger were Baltimore Copper Mills, Dallas Brass & Copper, Higgins Brass & Manufacturing, Michigan Copper & Brass, and Rome Brass & Copper Companies.

R. C. A., Westinghouse and G. E. Merge Radio Interests

Concentration of the research, manufacturing and sales activities of Radio Corporation of America, General Electric Company and Westinghouse Electric & Manufacturing Company in the field of radio sets, talking machines and other home entertainment devices was announced recently by the three companies. A new corporation, the R. C. A. Victor Corporation, has been formed. Unified operation will begin Jan. 1, 1930, without any change in the present distribution facilities.

In a joint statement James G. Harbord, president of R. C. A.; Gerard Swope, president of General Electric, and Frank A. Merrick, president of Westinghouse, said: "Of major importance is the unification of the radio research and engineering facilities of General Electric, Westinghouse, R. C. A. and Victor so that the same staffs that have produced so many of the major contributions to science and engineering in radio and home entertainment, will not only cooperate in the future, but will actually be consolidated under single and unified direction."

The president of the R. C. A. Victor Corporation will be E. E. Shumaker, president of the Victor Talking Machine Company. J. L. Ray, vice-president of the Radio Corporation of America and head of the present selling organization for both Victor and R. C. A., will continue in charge of sales as vice-president of the new company. H. C. Grubbs, at president vice-president in charge of the Victor Talking Machine division, will continue in that capacity. Alfred Weiland, formerly vice-president in charge of production for the Victor Talking Machine Company will be vice-president in charge of all manufacturing activities of the new company. Executives and sales headquarters will be located in New York City.

Power and Mechanical Progress to Feature New York Show

The sum total of all the progress in power and mechanical engineering from the time before Watts' invention of the steam engine to the present day will be on display at the Eighth National Exposition of Power & Mechanical Engineering at the Grand Central Palace, New York City, the week of December 2nd. Particular stress will be placed on the great strides made in the last decade.

The American Society of Mechanical Engineers and the American Society of Refrigerating Engineers will hold meetings during the progress of the show.

There will be visible at the exposition schemes and plans for the cutting of construction, operating and maintenance costs by means of modern equipment, machinery, materials, instruments, tools and supplies. Visitors at the exposition will be able to compare at a glance the relative merits of various mechanical devices on the market.

Flatiron Cord Standard Tentatively Adopted

An industry conference under the sponsorship of the Underwriters' Laboratory has been organized with a view to securing a separate and distinct Underwriters' Standard on flatiron cord, which will reduce the hazard of flatiron cords and which will be in keeping with the particular service required of the flatiron, namely, constant motion when in use under high temperature conditions. Representatives from the heating device section and from the heater cord section of the National Electrical Manufacturers Association have been present at meetings of the conference.

After careful consideration the technical committee of Nema and after a conference with the heater cord section, has come to the conclusion that it would be wise to have a tentative standard for flatiron cord adopted immediately, and recommended that such action be taken. It was agreed that the present laboratory standard of 1000 cycles, while satisfactory for appli-

We always do as the Romans do

Once you pass the boundaries of the United States you will find that even the electricity is different. Abroad they seem to have their own ideas about voltages, frequencies and such things that mean so much in a motor's life. And climate—how could we forget climate! Manufacturers of electrically powered devices who contemplate an invasion of the foreign field will do well to avail themselves of our dearly purchased experience. We have made motors for service in every country on the globe, and we can tell you frankly that, electrically at least, it always pays to do as the Romans do—or the Scandinavians, for that matter. There are dry countries, wet countries, a miscellany of other little things and a rather special insulation that saves a world of trouble on all transoceanic jobs which you ought to know about. Why not let us tell you?

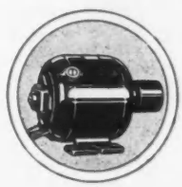
If you have a problem in electrical-motored machinery come to Robbins & Myers. We offer you the facilities of a completely modern plant, and the experience of 31 years' precision manufacture in designing, building and applying electric motors, generators, fans, and electrical appliances

Partial List of Apparatus to which Robbins & Myers Motors have been successfully applied

Adding Machines	Confectioner's Machinery	Humidifiers	Movie Projectors
Advertising Displays	Conveyors	Ironing Machines	Portable Tools
Air Compressors	Dental Lathes	Labeling Machines	Printing Presses
Baker's Machinery	Dish Washers	Oil Burners	Spray Equipment
Blowers	Driers	Office Appliances	Ticket Selling Machines
Brick Machinery	Floor Surfacers	Organ Blowers	Vacuum Cleaners
Churns	Folding Machines	Mailing Machines	Ventilating Fans
Cloth Cutters	Heaters	Machine Tools	Unit Heaters
Coffee Mills	Heat Regulators	Meat Choppers	Washing Machines
Coin Counters	Hoists	Milking Machines	Wrapping Machines

Robbins & Myers, Inc.

Springfield, Ohio **Brantford, Ontario**

1878  1929

ances, is not satisfactory for flatiron cords, and that most flatirons now being sold are provided with a higher standard of cord.

Following considerable discussion, it was unanimously agreed to recommend to the industry conference that a tentative Underwriters' Laboratory standard on flatiron cord be adopted, with the requirement of the cord withstanding 3000 cycles on the Underwriters' heater cord testing machine; to be used until such time that a more complete standard can be worked out and agreed upon. It was further decided that in order to identify standard flatiron cord the Underwriters' Laboratory label will be placed on the heater cord every five feet.

Edw. S. Ridgway Sales Head of Meadows Mfg. Co.

Edward S. Ridgway has been appointed general sales manager of the Meadows Manufacturing Company, Bloomington, Ill., according to an announcement by H. L. Barker, president of the company. Mr. Ridgway has been associated with the Meadows organization in an executive capacity since January 1, 1929.

Edw. S. Ridgway

Mr. Ridgway has had extensive experience in the appliance field. He was previously president of the Utensils Company, Fort Wayne, Ind., and general manager in charge of sales of the Hurley Machine Company, Chicago. He was also associated with the Speedway Products Company, Cleveland.

In announcing the appointment Mr. Barker stated that he had selected a man of experience in the manufacturing, as well as sales, advertising and promotion work.

New Company Takes Over Detroit Edison Range

Electro-Master, Inc., a new company with assets of over $1,000,000, has been organized to take over the new electric range manufacturing business developed during the last year by the Edison Illuminating Company of Detroit, a subsidiary of the Detroit Edison Company. This new organization, headed by Warren Noble, the engineer responsible for the design and production of "Electrochef," now owns all the assets of the range manufacturing venture of the Detroit Edison Company. The factory has been in production since Sept. 1 and is now equipped for the manufacture of 100 Electrochefs per day. Shipments have already been sent to more than eighty electric light and power companies throughout the country.

Atlantic City Wins

It was definitely decided by the board of directors of the Radio Manufacturers Association, at a meeting in Chicago, that the 1930 annual convention and trade show will be held during the week of June 2, at Convention Hall, Atlantic City, N. J. The coast resort won over Chicago, where the radio show has been held for the past three years.

Watch Flexible Cords, Mr. Manufacturer, After January 1, 1930

STANDARD
WHEN you find cords like that at the right after Jan. 1, you may be sure they are standard. Parallel threads of all braids must touch when viewed under an ordinary magnifying glass. The rubber covering must be tough and stretchy
WHEN you find cords having skeleton braids similar to those at the left, you may be certain that they are substandard. The upper circle shows the inner braid and the lower the outer braid. Adjacent braids must show no white spaces
SUBSTANDARD

Hall Electric Heating Company Names Miller Sales Head

Appointment of A. O. Miller, formerly of the American-Brown Boveri Electric Corporation, as general sales manager of the Hall Electric Heating Company, has been announced by that organization's headquarters in Philadelphia.

A. O. Miller

Mr. Miller, who has been with the Hall Company **only** since last July, has had wide experience as sales engineer and in other capacities with a number of outstanding commercial organizations.

Following his graduation from the Massachusetts Institute of Technology, he joined the Westinghouse Electric and Manufacturing Company's East Pittsburgh plant. With the rapid expansion of trade with China, Mr. Miller was offered the position of manager of engineering and purchasing for the Wah Chang Trading Company of New York. More recently he has been identified with sales promotion of the Worthington Pump and Machinery Company's large pumping units in the water-works field.

Novel Features in Construction of Allied Die-Casting Plant

A new plant in Long Island City, N. Y., completely equipped with the most up-to-date operating equipment, and with every inch of available space utilized to the best advantage, is now the home of the Allied Die-Casting Corporation. The building offers 75,000 sq. ft. of space on four floors, all well ventilated and lighted.

Each floor is supported with a minimum of supporting pillars. All pipes and drains from die-casting machines and ingot molds pass through the floor structure, eliminating all piping on the floor level. Each floor is heated by unit heaters suspended from the ceiling, thus saving floor and wall space.

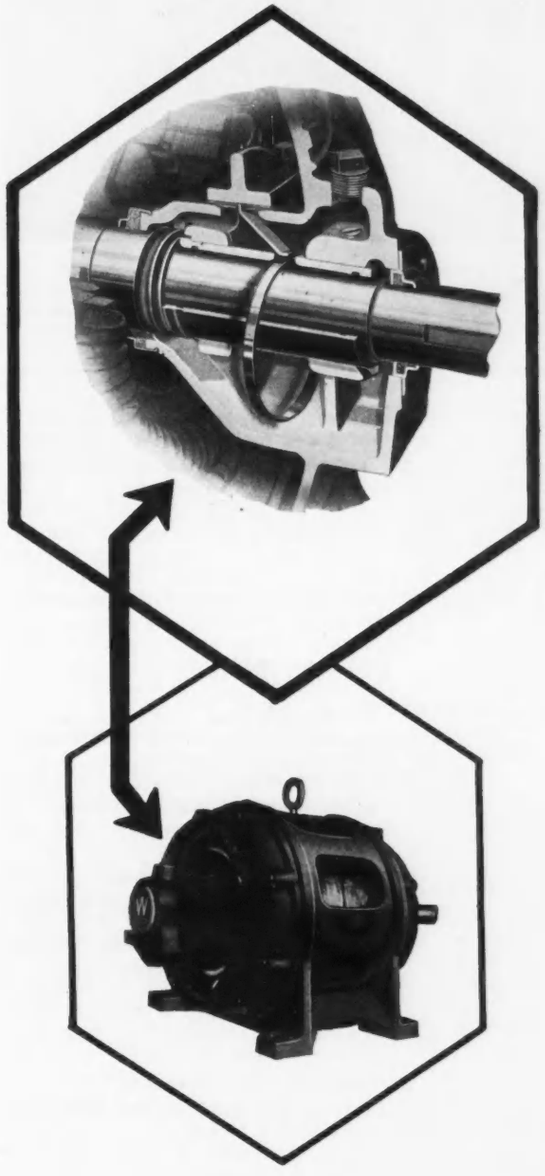
The entire plant has been designed and various departments have been planned to conserve time and labor. The engineering department, for example, is centrally located, so that it is equally close to all departments requiring its services.

New Firm Will Manufacture High Speed Commutators

Cleveland Commutator Company, 1882 E. 55th Street, Cleveland, is a new organization formed to manufacture high speed commutators.

E. A. Mentges for five years general manager and superintendent of the Homer Commutator Company is president of the new company and John J. Hale for twenty years identified with the Homer Com-

OIL can't get out DUST can't get in



IN the Westinghouse Sealed Sleeve bearing, the shaft rides on a cushioning film of oil which absorbs the vibration, shocks and jars to which all motor bearings are subjected.

In designing the Sealed Sleeve bearing, Westinghouse engineers have sought to overcome the objectionable features of the ordinary sleeve bearing. Oil leakage with resultant oil-soaked windings—the cause of 75% of all motor failures—has been eliminated. By an arrangement of air passages, it has been made normal for the oil to stay in the Sealed Sleeve bearing. Felt washers and patented guards prevent all foreign matter from entering to grind the life out of the bearings. The penalties of improper oiling have been guarded against. The desirable features of the sleeve bearing—its cushioning film of oil, its low unit area bearing pressure, and its simplicity have been retained.

These features of the Sealed Sleeve bearing mean improved motor performance because of reduced bearing wear, fewer shut downs and less maintenance required.

Westinghouse motors offer additional distinctive features—Dual-treated Windings, Combination Slot Cells which eliminate hot spots, Radio Frequency Tested Insulation, and Directed Ventilation—your assurance of efficient and dependable electric drive.

Numerous well-equipped and efficiently-manned Service Shops throughout the country assure prompt Service to the purchasers of Westinghouse products.

WESTINGHOUSE ELECTRIC & MFG. COMPANY
EAST PITTSBURGH PENNSYLVANIA

SALES OFFICES AND SERVICE SHOPS IN ALL PRINCIPAL CITIES OF THE UNITED STATES

Westinghouse

T 30863

mutator Company is vice-president. The factory is equipped with the latest types of machinery which includes cone automatics with special attachments to make the steel parts of commutators.

General Electric Sales Rise in Third Quarter

Orders received by the General Electric Company for the three months ended September 30th amounted to $116,688,014, compared with $90,328,666 for the corresponding quarter of 1928, an increase of 29 per cent, President Gerard Swope has announced.

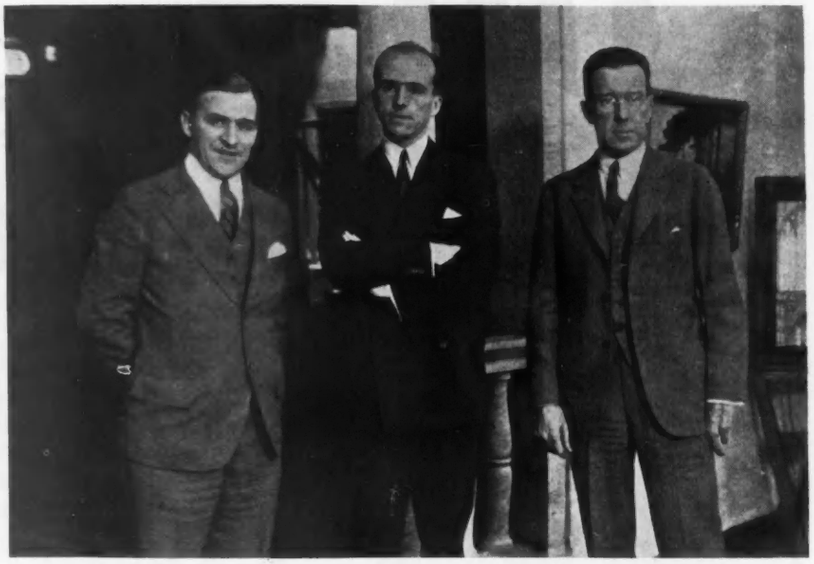
For the nine months ended September 30th orders received amounted to $337,404,470, compared with $260,686,463 for the first nine months of last year, also an increase of 29 per cent.

Sales billed during the first nine months of 1929, amounted to $301,812,808.55, compared with $242,676,762.07 for the corresponding period last year, an increase of 24 per cent. Profit available for dividends on common stock for the first nine months of 1929 was $47,965,831.71, compared with $36,910,649.96 for the corresponding nine months last year.

Four Tungsten Manufacturers in Consolidation

Organization of the Tungsten Electric Corporation (of Delaware) recently revealed a consolidation of four prominent manufacturers of tungsten and molybdenum products for the electrical equipment industry. The new company has acquired the business and assets of Callite Products Company, Inc.; Independent Contact Manufacturing Company, Inc.; International Wire Company, Inc., and Precision Metal Products Company. All the plants of the companies named are located in Union City, N. J.

Westinghouse Institute Draws Royalty



A DISTINGUISHED visitor at the Westinghouse Lighting Institute recently was Count Pierre de Brissat, representing the Schneider Company of France. Above, left to right, are Ralph Neumuller, director of the Institute, Count de Brissat and R. L. McLellan, managing director of the Westinghouse International Company

Brevities

Square D Company, Detroit, has announced the following changes in its sales organization: J. J. Mitchell, previously branch sales manager in Cleveland, has been transferred to the company's general branches in Detroit. M. D. Parmalee, previously sales representative in Cleveland, will fill Mr. Mitchell's place as branch manager. R. C. Thompson, formerly of the Moock Electric Supply, Canton, Ohio, succeeds Mr. Parmalee as sales representative in Cleveland.

Grigsby-Grunow Company, Chicago, has reduced its model 91 Majestic radio receiver which formerly sold at $137.50, less tubes, to $137.50 complete with kit of Majestic tubes; model 92 which formerly sold at $167.50 less tubes is now sold at $167.50 with tubes. All Majestic dealers are to be given a kit of Majestic tubes free for every Majestic receiver they had in stock on Nov. 1. This price change is in effect a reduction of $21.50 per set.

Kolster Radio Corporation has elected as vice-president in charge of the merchandising division, to succeed Major Herbert H. Frost, who recently resigned, L. T. Breck, sales manager of the organization for the past year. For three years prior to joining Kolster, Mr. Breck was Western sales manager for the Yale Corporation.

P. A. Geier Company, manufacturer of Royal Electric Cleaners, has apointed as sales manager, J. H. Mann, former merchandising manager. He has been identified with the electrical industry since 1906. In 1915 he joined the P. A. Geier Company, and in 1923 was named merchandising manager. He succeeds H. C. Hannink, resigned.

Yale Electric Company, Los Angeles, Cal., has leased space for a two-story factory to be erected at 912 East Second St., for a new plant to manufacture electric specialties. The addition will cost about $30,000 with equipment.

Arcturus Radio Tube Company, Newark, N. J., has appointed as manager of export sales of Arcturus products, Walter A. Coogan, for many years associated with the foreign sales and advertising department of the Baldwin Locomotive Works.

Parker Electrical Manufacturing Company has been organized to succeed the Double D Electrical Manufacturing Company, Third and Washington Sts., Oakland, Cal. Charles F. Parker, formerly manager of the Western Safety Manufacturing Company and Brown & Pengilly, San Francisco, is president of the new firm. P. De Bernardi, vice-president of the company, was formerly with the Western Safety Manufacturing Company and Diamond Electrical Manufacturing Company, San Francisco. The Parker Electrical Manufacturing Company will produce a complete line of safety switches, panelboards, switchboards and similar electrical equipment.

CeCo Manufacturing Company, Inc., Providence, R. I., announces that W. D. Powers has joined the CeCo organization as merchandise manager. It is expected that Mr. Powers will assume some of the heavy load which has heretofore been carried by the advertising and sales executives. He comes to the company from the automotive field, having previously been connected with the Buick company in Providence.

Hurley Machine Company recently inaugurated a special $75,000 international sales contest on the sale of Thor appliances. More than eight thousand Thor dealers have entered salesmen in the contest which began Oct. 1 and will and Dec. 24.

Gunite Corporation, Rockford, Ill., has appointed Erwin J. Mohr as manager of industrial sales. Mr. Mohr was for many years sales manager for the Kinite Corporation of Milwaukee. In his new capacity he will work with machinery manufacturing to solve problems and save costs through the use of special ferrous metal.

Despatch Oven Company, 62 Ninth St., S. E., Minneapolis, has appointed the Industrial and Combustion Engineering Corporation, 303 Protected Life Building, Birmingham, Ala., as district engineer for the Despatch Oven Company, covering all of Alabama, Georgia, Mississippi, and Tennessee.

Anaconda Wire & Cable Company, Muskegon, Mich., has opened a new office in the Fisher Building in Detroit, under the management of A. S. McCloy.

Wappat, Inc., Pittsburgh, Pa., is the new name for the Wappat Gear Works. Since 1923 the company has built up

The Weston Model ONE—the Pioneer and still a scientific standard in the art of electrical measurement.

The Portland or Barberini Vase, found in a sarcophagus in Rome. Attributed to the first century B.C. One of the most celebrated of the world's art treasures.

What Worth ORIGINALS?

ONLY a vase, wantonly broken by profane hands, the lone survivor of an ancient craftsmanship—how priceless in the eyes of the world of art!

For here, in this bit of exquisite pottery, lives and breathes the spirit of an age when man's handicraft was enriched by ennobling ideals, as yet untainted with commercial greed.

And as the world grows older it yearns again to express the glory of true art—to stem the tide of hastily made products which all but atrophy our sense of genuine worth and our appreciation of quality and real utility.

The cheap and artless imitations of the masters will never command a following. Lacking the inspired touch of genius they will ever fail to arouse the creative instinct which only originals can summon into action. As in art, so in the realm of science and industry. In an age of vast production great institutions and business leaders devote their resources and their skill to the end that their works may advance the cause of human service.

Quality has always been the companion of progress. And today, more than ever before in the world's history, the very magnitude of our corporate and personal ambitions demands the finest and best of everything.

Even in their commercial haste, business institutions will wait for the best, knowing full well that nothing so effectually retards progress as poor products, whether they buy them or make them. And craftsmanship takes time.

What worth, originals? Whether vases or instruments—the standards of art or of science—no money can measure their intrinsic value.

Weston
PIONEERS SINCE 1888
INSTRUMENTS

WESTON ELECTRICAL INSTRUMENT CORPORATION
582 Frelinghuysen Avenue Newark, New Jersey

a successful line of portable electric tools, bearing the trade name of "Alta." The Wappat organization, with F. W. Wappat as president and manager, is a division of the Simonds Saw and Steel Company.

Chicago Gear Works, manufacturer of gears, sprockets, pulleys, etc., 769-773 West Jackson Boulevard, Chicago, is the new name for the Chicago Stock Gear Works.

Wagner Electric Corporation, St. Louis, recently announced the removal of two branch sales offices. Milwaukee Sales and Service Office has been moved from 501 Broadway to 525-27 Broadway. The St. Louis Sales Office has been moved from 505 Shell Building to 909 Plaza Olive Building.

General Refractories Company, 106 South 16th St., Philadelphia, has appointed the Desch Supply and Equipment Company, 16 South Frederick St., Baltimore, as representative in Maryland for the General Refractories line of high temperature cement.

Republic Brass Corporation, Baltimore, Copper Mills Division, has moved from 357 West 12th St. to 230 Park Ave., New York City.

Westinghouse Lamp Company, East Pittsburgh, Pa., has let a contract for the erection of a manufacturing plant at Bloomfield, N. J. A five-story structure to be known as the Wire Products Building will be built of reinforced concrete, covering a plot of 200 x 80 ft. This structure will involve a cost of about $700,000 and is expected to be completed by Jan. 1, 1930.

Diamond Chain and Manufacturing Company, Indianapolis, Ind., has named the L. A. Benson Company, Baltimore, as distributors for Diamond Roller Chains to the industrial trade.

Champion Switch Company, Kenova, W. Va., has placed in charge of the inspection department, Rudolph J. Stewart, formerly with the West Penn Power Company in charge of inspection and construction work.

Coming Conventions

American Institute of Electrical Engineers.—Annual winter meeting at New York City, Jan. 27-31, 1930.

American Society of Mechanical Engineers.—Annual meeting at New York City, Dec. 2-6.

American Society of Heating and Ventilating Engineers.—Annual meeting in Philadelphia, Jan. 27-31, 1930. During the same week, International Heating and Ventilating Exposition at the Commercial Museum, Philadelphia.

Eighth National Exposition of Power and Mechanical Engineering.—Grand Central Palace, New York, Dec. 2-7.

Factory and Production Exposition.—Chicago, March 3-7, 1930.

National Electric Light Association.—Annual convention, San Francisco, Cal., week of June 16, 1930.

Factory and Production Exposition.—(Management of Midwestern Exposition, Inc.) To be held at Chicago, March 3-7, 1930. Labor saving, material handling, new construction materials and designs.

Radio Manufacturers Association.—Annual convention and exhibition, at Atlantic City, N. J., week of June 2, 1930.

Obituary

John W. Lieb, senior vice-president of the New York Edison Company and one of the early associates of Thomas A. Edison, died on Nov. 1 at his home in New Rochelle, N. Y. He was 68 years of age.

John W. Lieb

Mr. Lieb had charge of the installation of the electrical equipment in the old Pearl St. station of the New York Edison Company in 1882, the original power generating plant built by Edison in New York City. Mr. Lieb was a graduate of Stevens Institute. He spent several months with the Brush Electric Company in Cleveland, following which he joined the Edison Electric Light Company in New York as a draftsman. He was sent by Edison to Italy to supervise the erection of the dynamos and other equipment for the Italian Edison Company.

Mr. Lieb was past president of the Edison Pioneers, the American Institute of Electrical Engineers, and the National Electric Light Association.

Henry C. Houck, manager of the General Electric Company merchandise department, died at his home in Bridgeport, Conn., Oct. 15, after a long illness. He joined General Electric in 1899, after graduating from University of Pennsylvania, in electrical engineering. In his 30 years with the company he filled many positions of importance at Schenectady, Cleveland and Cincinnati. He became manager of the merchandise department in 1925.

Manufacturers Literature

ELECTRICAL MANUFACTURING *presents a digest of recently issued catalogs, bulletins and other advertising material. Manufacturers are invited to send literature for review in this column.*

I-T-E Circuit Breaker Company, 19th and Hamilton Sts., Philadelphia. New 1929-30 catalog, containing 66 pages of I-T-E Circuit Breaker and U-Re-Lite descriptions, illustrations, dimension drawings, prices and shipping weights. The new list prices and discounts went into effect Nov. 1.

Gurney Ball Bearing Company, Jamestown, N. Y. "Ball Bearing Manual," a complete work on ball bearings, cross-referenced and indexed to cover every phase. All text matter is short and to the point, and expressed in a few plain words. All subjects are arranged in such a form that the reader can pick out exactly the part he wants without being obliged to wade through all other matters.

Louis Allis Company, Milwaukee. A 12-page bulletin covering Louis Allis "explosion proof" or Type E motor. The bulletin gives results of the severe explosion tests made by the Underwriters before getting their approval, and actual photographs of applications where motor drive was formerly considered impossible are shown.

Fusion Welding Corporation, 103rd St. and Torrance Ave., Chicago. Descriptive bulletin No. 4, Type S welding rod. The rod has been developed for welding the 18-8 chrome-nickel and similar alloy steels which are used in industry to resist corrosion and elevated temperatures.

Columbia Electric Manufacturing Company, 1292 East 55th St., Cleveland. A new bulletin describing in detail the design and construction of Columbia electro-plating generators.

Ohio Brass Company, Mansfield Ohio. Catalog No. 20 and Supplement No. 3, which lists the new products of this company, placed on the market since the No. 20 catalog was issued.

Silvray Company, Inc., 5357 West 14th St., New York. A new publication discussing the construction and application of Silvray industrial lighting units.

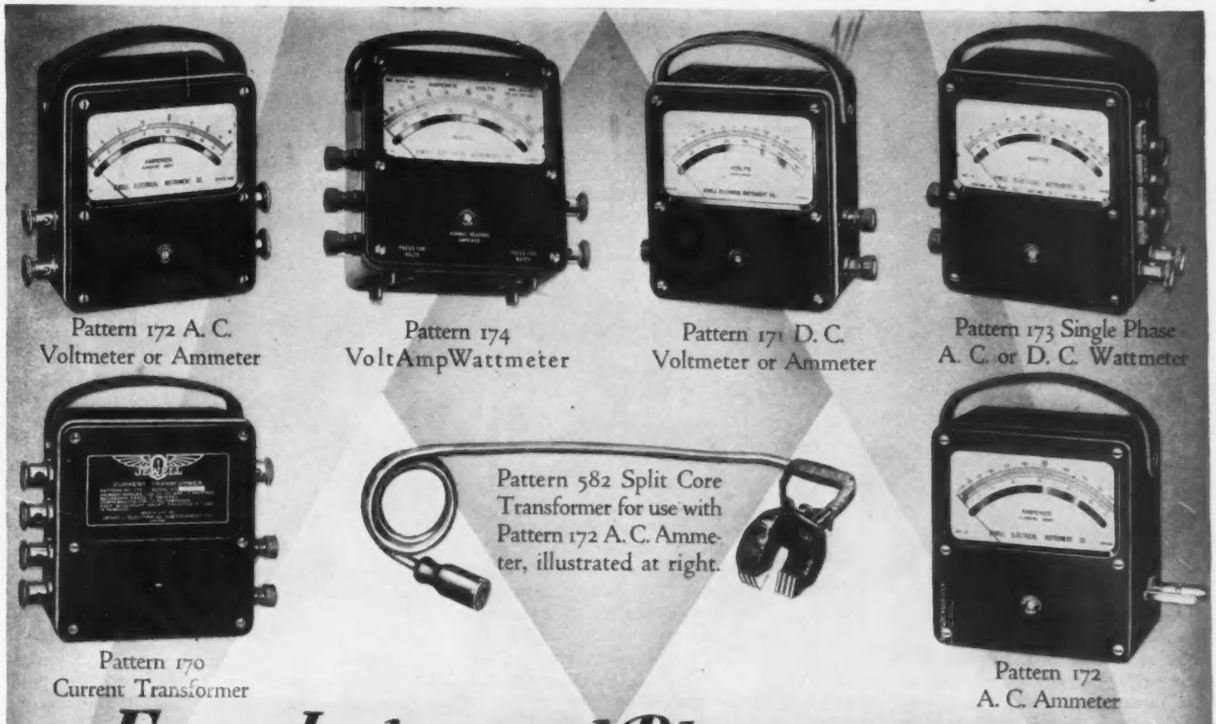
Crouse-Hinds Company, Syracuse, N. Y. Catalog 2200, 280 pages, covering condulets, groundulets, plugs and receptacles. This issue supersedes all previous listings.

Information Wanted

We have been asked for the names and addresses of manufacturers of the articles listed herewith.

Replies from our readers to any of these inquiries will be greatly appreciated by the Information Bureau of ELECTRICAL MANUFACTURING, 461 Eighth Avenue, New York City.

"Parker" Canopy Insulating Block.
"Burrows" Therapeutic Lamp.
"L. R. Co." Receptacles.
"Williams" Commutator Dressing.
"Splendida" Electric Iron.
"Flint" Waffle Iron.
"Pioneer" House Pump.
"Blaisdell" Electric Cigar Lighter.
"Defiance" Cigarette Lighter.
"Hillcrest" Line of Lighting Fixtures.
"Vesodore" Cigar Lighter.
"Thermodyne" Therapeutic Lamp.
"Medsco Beauty" Iron.
"Seco" Plug Fuses.
Electromatic Traffic Dispatch Co.
"Aspinall" Soldering Fluid.
"Indulet" Fittings.



Pattern 172 A. C. Voltmeter or Ammeter

Pattern 174 VoltAmpWattmeter

Pattern 171 D. C. Voltmeter or Ammeter

Pattern 173 Single Phase A. C. or D. C. Wattmeter

Pattern 170 Current Transformer

Pattern 582 Split Core Transformer for use with Pattern 172 A. C. Ammeter, illustrated at right.

Pattern 172 A. C. Ammeter

Every Industrial Plant can afford JEWELL Master Instruments

IN the maintenance of plant electrical equipment; in the inspection of electrical products; in the design of electrical apparatus; and in the service of electrically operated machinery, reliable electrical testing instruments are the basis of scientific operation.

The Jewell Line of Master Instruments in intermediate size bakelite cases of uniform dimensions meets every requirement of electrical testing. Their ½ of 1% accuracy guarantee is more than adequate for the great majority of uses. Their compact, uniform size makes it easy to carry a complete group in a small case.

No expense has been spared in making Jewell Masters the best intermediate size instruments that can be made. Yet, through the use of quantity production methods and die made parts that are completely interchangeable, Jewell Master Instruments come to you at a very moderate cost.

Bakelite cases of uniform size; large scale openings protected by non-shatterable glass; long, hand-drawn scales; and knife-edge pointers of seamless aluminum, are features that suggest the quality of Jewell Master Portables.

You should know all about Jewell Master Instruments. Ask the nearest Jewell Representative to tell you about them, or mail the coupon, today.

The Jewell Electrical Instrument Company makes a complete line of high grade A. C. and D. C. instruments for every purpose, including switchboard instruments from 2 inches to 9 inches in diameter, and portable instruments from small pocket sizes to laboratory precision standards. Catalog sent on request.

29 YEARS MAKING GOOD INSTRUMENTS

JEWELL

Master Instruments

Jewell Electrical Instrument Company
1650 Walnut Street, Chicago, Illinois

Of course I want to know about the most complete line of intermediate size instruments. Mail your bulletin.

Name----------

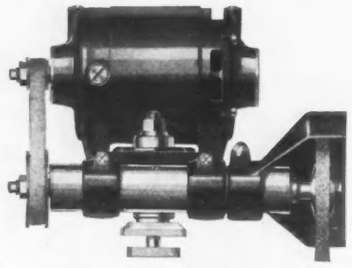
Company----------

Address----------

New Goods for Your Inspection

No. 5 Dumore Grinder

The Dumore Co., Racine, Wis., is marketing the Dumore No. 5 grinder. It is a portable tool designed for use either in production grinding, the tool room and the machine shop. It is built around a ½-hp. universal motor operating at 10,000 to 12,000 r.p.m. on either alternating or direct current. It is supplied complete with

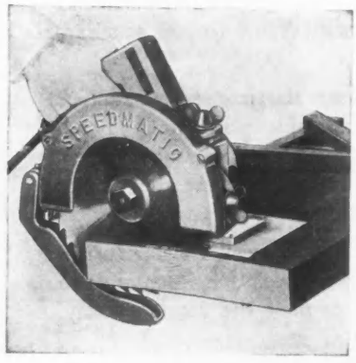


the necessary wheel guard, four quills and a removable tool post holder.

The motor is pivotally mounted on a cast-iron frame, and a spring tension provides automatic take-up for the belts. The quills are held in place by two clamps, and the rubber-insulated connector cord is fitted with the necessary switch.

Speedmatic Saw

Porter-Cable Machine Co., Syracuse, N. Y., is introducing a light type electrically driven hand saw. It operates on either alternating or direct current at a speed of 10,000 r.p.m. and weighs complete 12 lb. The equipment includes one saw blade, 15 ft. of rubber-covered con-



ductor cable, a triangular cross-cutting guide and a combination screwdriver and wrench.

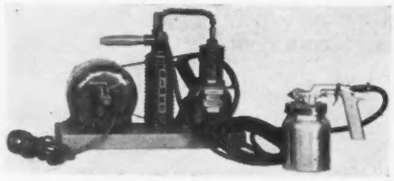
The saw is mounted directly on the motor spindle, eliminating all gears, and adjustments for angular cutting are made by one thumb screw. The motor is of ½ hp., and the saw of 8 in. diameter will cut to a 2¼ in. depth.

Binks Spray Equipment

The Binks Mfg. Co., 3114 Carroll Ave., Chicago, announces the completion of an all-purpose utility spray painting and finishing outfit, known as the Binks New Hurley Unit.

This outfit is being manufactured for general utility work, such as touching up, refinishing, and lacquering practically any product within an organization. It is also adapted for the spraying of insecticides and disinfectants.

It is a complete unit equipped with a full size quart all-metal container and a



new Binks pressure cup spray gun, supplying an atomized flat spray 4 in. in width.

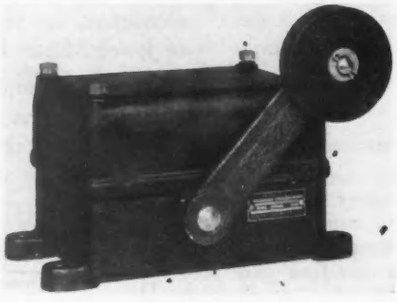
The air compressor unit is belt-driven and connected to a ¼-hp. electric motor. This unit has a capacity of 2.16 cu. ft. of air per minute.

The outfit is sturdily constructed. A ribbed, cast iron air container is mounted between the motor and the compressor on a pressed metal case, all of which is mounted on rubber feet. The cylinder and base are cast in block on seasoned gray iron.

Ten feet of rubber-covered electric cord, attachment plug, and 10 ft. of durable braided rubber air hose are attached to the outfit.

Cam-Operated Switch

General Electric Co., Schenectady, N. Y., is manufacturing a line of cam-operated, double-break, master and limit switches, bearing the designation LS-429. The limit switches are expected to be of special value in the steel industry and on such applications as skip hoists, car dumpers and other machines requiring the geared type switch. The master switches bear the

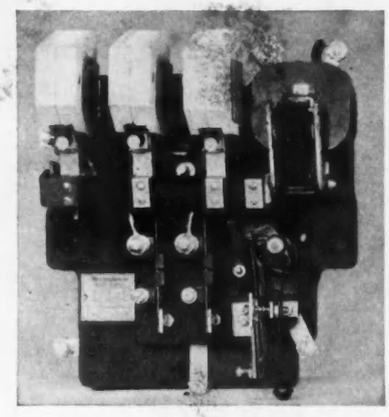


designation C-3614 and C-3616, and in general are for the same type of service as the limit switches.

The limit switches can be adjusted by shifting, tripping and closing dogs on the cams. The contact mechanism is of the snap-action type and is latched in both the open and closed positions. This gives a positive action to the switch and also allows adjustment of the operating dogs to operate the contact mechanism through the entire 360 degrees of rotation.

Westinghouse Linestarter

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., is introducing a line starter without a cabinet. It is designed for machinery applications where no cabinet is required. It has the deion arc quenching device and a hand and auto-

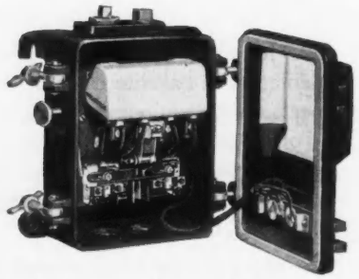


matic reset thermal relay which eliminates the necessity of the operator leaving his station and going to the starter to put the motor back on the line after an overload.

Motor Starting Switch

The Allen-Bradley Co., 286 Greenfield Ave., Milwaukee, Wis., now furnishes a splash-proof starting switch for A.C. motors used in laundries, creameries, packing plants and other industries where wash down of equipment is essential, or where excessive moisture is present. This switch is also ideal for dusty installations, such as in flour mills, cement plants, etc.

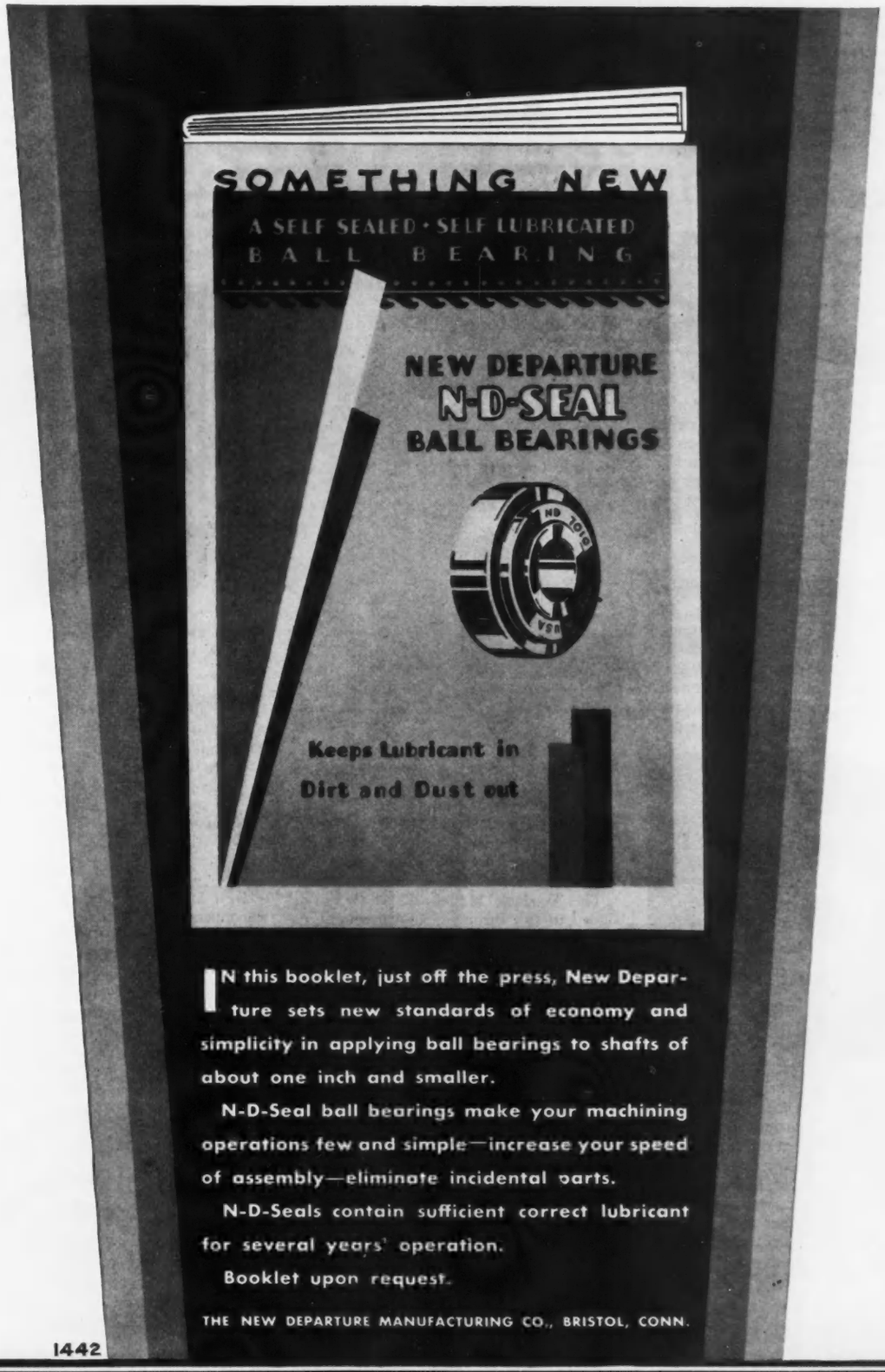
The Allen-Bradley Bulletin 709WT Splash-Proof Across-the-Line Starting



Switch gives complete overload, no-voltage and dead-phase protection. It is rated up to 3 hp., 110 volts and 5 hp., 220 volts for single phase motors, and up to 5 hp., 220 volts and 7½ hp., 440-550 volts for polyphase motors. The switch is furnished in three forms: Form 1—with push buttons in cover; Form 2—for external pilot control, and Form 3—with two-way lever switch.

Electric Paint Sprayer

The Breuer Electric Mfg. Co., 852 Blackhawk St., Chicago, has recently placed on the market an electric paint spray machine (compressor type) designed for touch-up work, shading and light finishing and refinishing jobs, as well as



IN this booklet, just off the press, New Departure sets new standards of economy and simplicity in applying ball bearings to shafts of about one inch and smaller.

N-D-Seal ball bearings make your machining operations few and simple—increase your speed of assembly—eliminate incidental parts.

N-D-Seals contain sufficient correct lubricant for several years' operation.

Booklet upon request.

THE NEW DEPARTURE MANUFACTURING CO., BRISTOL, CONN.

1442

NEW DEPARTURE
BALL BEARINGS

semi-production and maintenance industrial painting work.

This paint sprayer is of the rotary compressor type, built of aluminum castings, equipped with ⅓-hp. universal motor, and develops a pressure of over 35 lb. The compressor unit weighs 7 lb.

The spray gun is equipped with two

tips, one slotted for fan spray and the other narrow spray and covering an area of 2 to 14 in. Handy adjusting screw controls the amount of paint to be used.

The outfit complete is equipped with quart container, two tips, 20 ft. of reinforced rubber-covered cord, and 8 ft. of web-covered hose.

Rubicon Testing Instruments

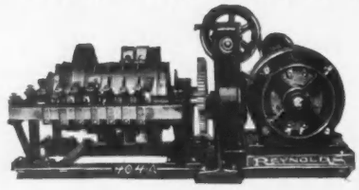
The Rubicon Co., 29 N. Sixth St., Philadelphia, announces a series of testing instruments, designed for quick checking of electrical parts and devices, such as resistances, heater coils, fuses, percussion caps, grid leaks, condensers, inductances, choke coils and tranformers. Each in-

strument consists of a bridge circuit and of a reflecting galvanometer all mounted in a walnut case. The galvanometer has an exceedingly short period and is deadbeat and may be either for direct or alternating current, depending upon requirements. Indications are given by a bright spot of light on a ground glass scale, on which the allowable tolerances are indicated by two black lines on both sides of the zero mark.

Reco Industrial Control

Reynolds Electric Co., 2650 W. Congress St., Chicago, is manufacturing an industrial control which is motor-driven. The motor drives a revolving drum, which is fitted with adjustable contacts, and these make contacts with goose-neck brushes as the drum rotates. Each control is specially made to suit its application, and they are so constructed as to provide any speed or timing desired.

A few of the more common uses of such a control are for starting, stopping or reversing motors; for automatic op-

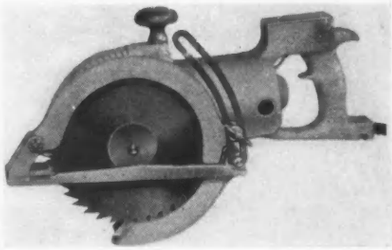


eration of signals, stop and go lights, elevators, fire pumps, automatic doors, call systems and danger signals.

Wodack Model "K" Hand-Saw

The Wodack Electric Tool Corp., 4627 W. Huron St., Chicago, has recently placed on the market a lightweight, one-hand electric saw for cutting any board up to 2⅝ in.

Its compact construction is featured by a sawdust blower for perfect vision, convenient trigger switch, momentary contact, rip gage to save marking board to



be sawed, and depth gage easily adjusted by one wing nut.

This unit is built complete, ready to use. Accessories include a 15-ft. extension cord, 1 lb. can of Wodack lubricant, grease gun, steel carrying case, adjustable depth gage and rip gage.

The Wodack Model "K" Saw is designed to suit the needs of carpenters, engineers and contractors on a wide variety of work. Also used for crating in industrial shipping departments, and plant maintenance and repair work of all kinds.

Wire Stripper

Colonial Premier Co., 225 W. Ohio St., Chicago, announces a wire stripper which is said to do the work of five pairs of hands. This machine is complete, ready to attach to any convenience or lamp outlet, with 10 ft. of asbestos covered wire, soft rubber attachment plug at one end and

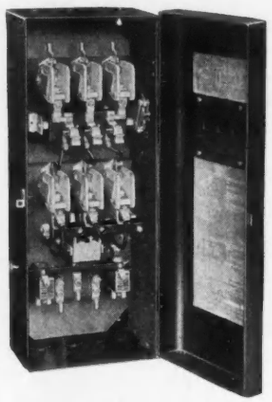
a detachable motor plug at the machine end. It is available in floor and bench models. The bench model weighs 35 lb. It will strip all kinds of wire up to ½ in. diameter. It uses a ball-bearing, ¼-hp. motor.

A. C. Motor Starters

The Allen-Bradley Co., 286 Greenfield Ave., Milwaukee, Wis., now furnishes its standard alternating-current across-the-line switches equipped with hand-operated disconnect switches and meter test jacks in one cabinet.

The disconnect switches are furnished with or without fuse clips. The meter test jacks permit the motor to be tested for load without opening switch cabinet or interfering with machine operation.

The switches provide overload, dead-



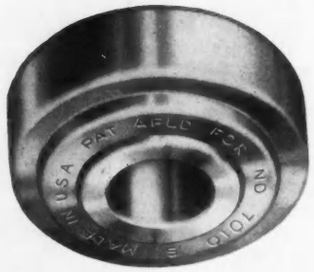
phase and no-voltage protection. The Type A switch will disrupt a locked motor current. The Type B switch is a motor service switch that disrupts 150 per cent motor full load current. The switches are rated up to 10 hp., 110 volts, 30 hp., 220 volts, and 60 hp., 440-550 volts, and are are furnished in three forms: Form 1—with push buttons in the cover; Form 2—for pilot control, and Form 3—with 3-way lever switch.

N-D-Seal Bearing

New Departure Mfg. Co., Bristol, Conn., announces a self-sealed, self-lubricating ball bearing, designed to reduce mounting costs and improve bearing efficiency.

The N-D-Seal bearing, as it is called, is made only in the smaller sizes and consists of what is essentially a New Departure single row ball bearing of the non-loading groove type, permanently fitted into a metal case or shell.

This shell is shaped on one side of the



bearing so as to contain a felt closure which fits over the ground outside diameter of the extended bearing inner ring, thus forming a seal both for the retention of lubricant and the exclusion of dirt.

The capacity characteristics of N-D-Seal bearings are substantially the same as corresponding sizes of non-loading groove single row bearings, and will resist a high amount of thrust.

MICA STAMPINGS

Sheet mica stamped to your specifications of any desired quantity and quality—or block mica in the original cases as received from our mines.

We carry the largest stock of imported mica in the country and will make immediate shipments.

EUGENE MUNSELL & CO.
200 Varick St., New York
542 So. Dearborn St., Chicago

INDIA, AFRICAN, SO. AMERICAN AMBER DOMESTIC

DUE to an oversight the Vulcanized Rubber Company advertising scheduled for the October issue of ELECTRICAL MANUFACTURING was omitted from that number.

Preprints of the anticipated October insertion had already been mailed by the advertiser, thereby incurring somewhat of an embarrassment.

We are therefore publishing this so as to correct any misunderstanding that may have resulted.

The Vulcanized Rubber advertising, previously intended for the October issue, is in this issue and will be found on page 18.

THE GAGE PUBLISHING CO., INC.

MICABOND
for COMMUTATOR INSULATION

Faulty commutator insulation is the cause of a large percentage of motor and generator failure with the consequent loss of thousands of dollars annually in interrupted production.

For this reason leading manufacturers in all lines of industry are vitally concerned about the matter of insulation.

For 30 years Micabond has been known for its uniform dependable quality—its high di-electric strength—its resistance to heat—and its reliability under the most severe conditions.

Micabond has become the standard mica insulation and its use means the elimination of insulation failure and consequent shutdowns and losses.

Write for further details or send your specifications for samples and prices.

CHICAGO MICA CO.
345 CAMPBELL STREET
VALPARAISO INDIANA

"The Standard Mica Insulation for 30 years"

THE STANDARD MICA INSULATION
MICABOND

Index of Raw Materials, Parts, Electrical Equipment

For all electrical products including electrically operated machines and appliances

Trade Names—Manufacturers' Names—Local Addresses

The names of all manufacturers are grouped alphabetically under the heading for the product they manufacture. Trade names also appear in alphabetical position under the subject identifying the product. Thus "Linolac" insulating varnish will be found in alphabetical position under the heading "Paint, Varnish, Lacquer."

Note: The Classified Index of ELECTRICAL MANUFACTURING is limited to those subjects of interest to the specific field which it covers, for obvious reasons. A complete Classified Index of all electrical commodities bought, sold, or used by Electrical Supply Jobbers, Contractors, Dealers, Central Stations and other electrical industry outlets appears regularly in each issue of ELECTRICAL RECORD as heretofore.

ALLOYS, LIGHT METAL
Bohn Aluminum & Brass Corp., Detroit, Mich.
Bohnalite. See Bohn Aluminum & Brass Corp.

ALUMINUM
(Also Aluminum Bronze Powder.)
Albron, Alcoa, Alumac. See Aluminum Co. of America.
Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh.
AMMETERS. See Instruments.
ARMATURE
Balancers. See Balancers, Armature.
Banding Machines. See Banding Machines, Armature
Bearings. See Bearings.
Buggies. See Lifts, Armature.
Coil Presses. See Presses, Armature Coil.
Coils. See Coils, Finished.
Core Punchings. See Discs, Armature.
Cranes. See Lifts, Armature.
Discs. See Discs, Armature.
Driers. See Ovens.
Growlers. See Testers, Coil.
Hoists. See Lifts, Armature.
Impregnators, Vacuum. See Ovens, Industrial.
Jacks. See Lifts, Armature.
Laminations. See Discs, Armature.
Lathes. See Lathes.
Lifts. See Lifts, Armature.
New. See Coils, Finished.
Notching Machines. See Notching Machines, Armature.
Pegs. See Pegs, Armature.
Pinion Pullers. See Pullers, Armature Shaft.
Repaired. See Repairing and Second-Hand.
Shaft Pullers. See Pullers, Armature Shaft.
Shaft Straighteners. See Straighteners, Armature Shaft.
Stands. See Stands, Armature.
Test Benches. See Test Benches, Armature.
Testers. See Testers, Coil; also Test Benches, Armature.
Torpedo Cord. See Twine, Armature Winding.
Trouble Shooters. See Testers, Coil; also Test Benches, Armature.
Trucks. See Lifts, Armature.
Wedges. See Pegs, Armature.
Winding Machines. See Winding Machines, Armature & Field Coil.
Winding Twine. See Twine, Armature.
ARMATURE & COIL SPRAY GUNS. See Spraying Outfits.
ARMORING MACHINES. See Wire Manufacturing Machines.
ARMS, FLEXIBLE. See Tubing Flexible Metallic.
ASBESTOS Shades. See Shades, Fabric.
Paper & Sheet. See Asbestos.
Slabs. See Asbestos Slabs.
Tape. See Tape, Asbestos.
Wire. See Wire, Insulated.
Yarn and Thread. See Yarn and Thread.

ASBESTOS
Sheet, Paper, Mill Board, Lumber.
Ambler Asbestos Shingle & Sheathing Co., Ambler, Pa.
Easco. See Eastern Asbestos Co.
Eastern Asbestos Co., Providence, R. I.
Ferodo & Asbestos, Inc., New Brunswick, N. J.
Johns-Manville Corp., New York, N. Y.

ASBESTOS SLABS
Slabs & Barriers for Switchboard.
Asbestos-Ebony. See Johns-Manville, Inc.
Ambler Asbestos Shingle & Sheathing Co., Ambler, Pa.
Decoleco, Inc., Wayne, Mich.
Electrobestos. See Johns-Manville Corp.
Ferodo & Asbestos, Inc., New Brunswick, N. J.
Johns-Manville Corp., New York, N. Y.
Transite. See Johns-Manville, Inc.
Zellite. See Decoleco, Inc.

BAGS, Vacuum Cleaner
Merrimack Mfg. Co., Boston, Mass.
BAKELITE MOULDS. See Dies, Die Makers.

BALANCERS, Armature
(Dynamic Balancing Machines—Balancing Ways).
Anderson Bros. Mfg. Co., Rockford, Ill. (Ways).
Armature Coil Equip. Co., 2415 Forestdale Ave., Cleveland, O. (Machine).
Bowsher Co., N. P., South Bend, Ind.
Cisco Testing Machine Co., Tinius, 500 N. 12th St., Philadelphia, Pa. (Machines)
Sundstrand Machine Tool Co., Rockford, Ill.
Twentieth Century. See Sundstrand Machine Tool Co.
Vibration Specialty Co., 1534 Winter, Philadelphia, Pa. (Machines).
BALL BEARINGS. See Bearings, Ball and Roller.

BANDING MACHINES, Armature
Columbia Machine Wks. & Malleable Iron Co., Atlantic Ave. & Chestnut St., Brooklyn, N. Y.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Peerless. See Electric Service Supplies Co.
Ridion Company, Frank, Boston, Mass.
BARRIERS, Switchboard. See Slate; also Soapstone; also Asbestos.
BARS, BUS. See Brass, Bronze & Copper; also Aluminum.

BARS, Commutator
Anaconda. See American Brass Co.
American Brass Co., Waterbury, Conn.
Buckeye Tempered Copper & Brass Co., Mansfield, O.
Cameron Electric Mfg. Co., Ansonia, Conn.
Commutator Co., 121 N. Front, Minneapolis, Minn.
Electric Materials Co., North East, Pa.
Eureka Metal Products Corp., 91 Clay, North East, Pa.
Homer Commutator Co., 4748 Hough Ave., Cleveland.
Rome Brass & Copper Co., Rome, N. Y.
BASES, Radio Tube. See Radio Molded Parts.

BASES, Reading Lamp
Metal, Pottery, Wood & Glass.
American Ring Co., Waterbury, Conn.
Aladdin Mfg. Co., Muncie, Ind.
Armor Bronze Co., Garwood, N. J.
Camden Art Tile & Pottery Co., Camden, Ark.
Estes & Sons, E. B., 5844 Grand Central Terminal, New
Fulper Pottery Co., Flemington, N. J.
Globe Metal Spinning Co., 178 Centre, New York, N. Y.
Hemill Products, Inc., 103 Mott, New York, N. Y.
Insulation Mfg. Co., New York Ave. and Herkimer St., Brooklyn, N. Y.
Marbleart. See Insulation Mfg. Co.
Natural. See Insulation Mfg. Co.
Roualc Mfg. Co., 200 Hudson, New York, N. Y.
Sneath Glass Co., Hartford City, Ind.
Van Briggle Tile & Pottery Co., Colorado Springs, Colo.
Weller, S. A., Zanesville, O. (Pottery.)
Yokel Corp., 219 Homestead Ave., Hartford, Conn.
Zane Pottery Co., South Zanesville, O.
BATTERY CHEMICALS. See Chemicals, Battery.
BATTERY CUT OUTS. See Switches, Battery.
BATTERY GAGES. See Instruments, Pocket.
BATTERY JARS. See Jars, Battery, Glass; also Rubber; also Molded Insulation.
BATTERY OXIDES. See Chemicals, Battery.
BATTERY SALTS. See Chemicals, Battery.
BEAD CHAIN. See Chain, Socket.
BEADS. Chandelier. See Crystals, Chandelier.

BEADS, Insulating
American Lava Corp., 1425 William, Chattanooga, Tenn.
Durco. See Struthers Dunn, Inc.
Martindale Elec. Co., 1262 W. Fourth, Cleveland, O.
Struthers Dunn, Inc., 136 N. Juniper, Philadelphia, Pa.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.

BEARINGS
Ball & Roller. See Bearings, Ball & Roller.
Graphite. See Bearings, Oil-less.
Oil-less. See Bearings, Oil-less.
Sleeve. See Bearings & Bushings.

BEARINGS, Ball and Roller
Aetna Ball Bearing Mfg. Co., 4600 Schubert Ave., Chicago, Ill.
Ahlberg Bearing Co., 312 E. 29th, Chicago, Ill.
Auburn Ball Bearings Co., 73 Clarissa, Rochester, N. Y.
Bantam Ball Bearing Co., South Bend, Ind.
Bearings Co. of America, Lancaster, Pa.
Commercial. See Schatz Mfg. Co.
C J B. See Ahlberg Bearing Co.
Fafnir Bearing Co., New Britain, Conn.
Federal Bearing Co., Poughkeepsie, N. Y.
Gurney. See Marlin-Rockwell Corp.
Hyatt Roller Bearing Co., Newark, N. J.
Hoffman. See Norma-Hoffman Bearings Corp.
McGill Metal Co., Valparaiso, Ind.
Marlin-Rockwell Corp., Jamestown, N. Y.
Mathews Mfg. Co., 104 Gold, Worcester, Mass.
New Departure Mfg. Co., Bristol, Conn.
Nice Ball Bearing Co. (Nicetown), Philadelphia, Pa.
Norma-Hoffman Bearings Corp., Stamford, Conn.
Roller Bearing Co. of America, Whitehead Rd., Trenton,
Schatz Mfg. Co., Poughkeepsie, N. Y.
Schubert. See McGill Metal Co.
Standard Steel & Bearings, Inc., Plainville, Conn.
Strom Bearings Co., 4587 Palmer, Chicago, Ill.
S. K. F. Industries, 40 E. 34th, New York, N. Y.
Timken Roller Bearing Co., Canton, O.
Torrington Co., Torrington, Conn.

BEARINGS, Oil-Less
Argute Oilless Bearings Co., 149 Berkeley, Philadelphia, Pa.
B. M. C. See Burlington Metal Corp.
Bogert & Hopper, Inc., 225 Varick, New York, N. Y.
Bound Brook Oil-less Bearing Co., Bound Brook, N. J.
Burlington Metal Corp., Burlington, Wis.
Cleveland Graphite Bronze Co., 880 E. 72nd, Cleveland, O.
Electric Railway Equipment Co., 55 Church, New York, N. Y.
Elreco. See Electric Railway Equipment Co.
Graphalloy. See Graphite Metallizing Co.
Graphite Metallizing Co., Yonkers, N. Y.
Lubrite. See Merriam Bros., Yonkers, N. Y.
Merriam Bros., 185 Amory, Boston, Mass.
Metal Saw & Machine Co., Springfield, Mass.
Moraine Products Co., First & Foundry Sts., Dayton, O.
Neveroil Bearing Co., Wakefield, Mass.
Nolu Oilless Bearing Co., 6 E. Johnson, Philadelphia, Pa.
O. & S. Bearing Co., 315 S. Artillery, Detroit, Mich.
Reliance. See Metal Saw & Machine Co.
Selb Lignum-Vitae Woodturning Co., 93 Boyd Ave., Jersey City, N. J.
United States Graphite Bearing Co., Saginaw, Mich.

BEARINGS AND BUSHINGS
(For Armature Shafts.)
Adjustable Bearing Co., 101 Transportation Bldg., Indianapolis, Ind.
Ajax Metal Co., Philadelphia, Pa.
American Bronze Corp., Berwyn, Pa.
Bohn Aluminum & Brass Corp., Detroit, Mich.
Bunting Brass & Bronze Co., Toledo, Ohio.
Damascus Bronze Co., Pittsburgh, Pa.
Durex. See Moraine Products Co.
Federal-Mogul Corp., Shoemaker & Lillibridge Sts., Detroit,
Flood City Mfg. Co., Johnstown, Pa.
Johnson Bronze Co., New Castle, Pa.
Lumen Bearing Co., Buffalo, N. Y.
Moraine Products Co., First & Foundry Sts., Dayton, O.
National Bearing Metal Corp. (More-Jones Brass & Metal Div.), 4950 Manchester Ave., St. Louis, Mo.
United States Graphite Co., Saginaw, Mich.
BELTING, Chain Transmission. See Chain, Power Transmission.

BELTS, Rubber
Molded Cord Rubber Belts for Electrical Appliances.
Dayton Rubber Mfg. Co., Dayton, O.
Fay Rubber Products Co., Elyria, O.
Gilmer Co., L. H., Cottman & Keystone Sts. (Tacony), Philadelphia, Pa.

BENDERS, Coil Loop
Armature Coil Equipment Co., 2415 Forestdale Ave., Cleveland, Ohio.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Segur. See Electric Service Supplies Co.
BENDING. See Punching & Bending.
BINDING POSTS. See Posts, Binding.

BLADES, Fan
Estes & Sons, E. B., 5844 Grand Central Terminal Bldg. New York, N. Y.
Spee-Dee Elec. Mfg. Co., 199 Lafayette, New York, N. Y.
Torrington Mfg. Co., Torrington, Conn.
BLUESTONE. See Chemicals, Battery.
BOARD, Fuller. See Cloth and Paper.
BOARD, Press. See Cloth and Paper.
BOMBARDING MACHINES. See Machines, Lamp Making.
BOWL HOLDERS. See Fixture Fittings.
BOX & CABINET BUSHINGS. See Bushings, Box & Cabinet.

BOX BOARD
Container Corp. of America, 111 W. Washington, Chicago
Mid-West Box Co., 111 W. Washington, Chicago.

BOXES, Fibre
Container Corp. of America, 111 W. Washington, Chicago
Corrfibre. See Container Corp. of America.
Mid-West Box Co., 111 W. Washington, Chicago.
BOXES, Sheet Steel. See Cabinets, Sheet Steel.
BOXES, Wood. See Cabinets & Boxes, Wood.

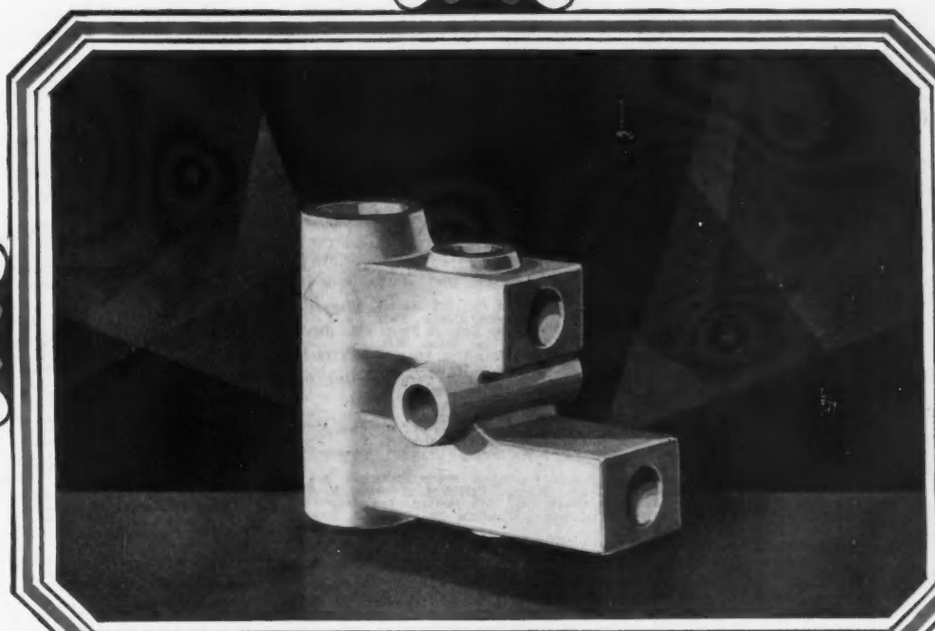
BOXES AND WRAPPERS
Agar Mfg. Corp., Whippany, N. J.
Brown & Bailey Co., 417 N. Eighth, Philadelphia, Pa.
Bulldog. See Pittsburgh Corrugated Paper Box Co.
Campbell Paper Box Co., South Bend, Ind.
Consolidated Paper Co., Monroe, Mich.
Container Corp. of America, 111 W. Washington, Chicago.
Gair Co., Robert, 420 Lexington Ave., New York. (Boxes.)
Gator-Hide Kraft. See International Paper Co.
Hinde & Dauch Paper Co., 325 Decatur, Sandusky, Ohio.
Huntington Paper Box Co., Huntington, Ind.
International Paper Co., 100 E. 42nd, New York, N. Y.
Lake Lithographing Co., 2570 Superior Ave., Cleveland, O. (Display Cartons.)
Mid-West Box Co., 111 W. Washington, Dept. 36, Chicago
National Folding Box Co., New Haven, Conn. (Cartons.)
Pequot Mfg. Corp., Glendale (L. I.), New York.
Pittsburgh Corrugated Paper Box Co., Pittsburgh, Pa.
River Raisin Paper Co., Monroe, Mich.
Rockford Fibre Container Co., Rockford, Ill.
Sefton Mfg. Co., 59 E. Madison, Chicago, Ill.
Shuttleworth Carton Co., 474 W. Broadway, New York.

BRACKETS, Instrument
For Suspending Meters to Station Switchboard.
General Electric Co., Schenectady, N. Y.
Roller-Smith Co., 239 Broadway, New York, N. Y.
Trumbull Elec. Mfg. Co., Plainville, Conn.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.
BRAIDING MACHINES. See Wire Manufacturing Machines.
BRASS TUBING. See Tubing, Brass and Copper.

BRASS, BRONZE AND COPPER
Sheet, Rod, Bar.
Anaconda. See American Brass Co.
American Brass Co., Waterbury, Conn.
American Nickeloid Co., Peru, Ind.
Baltimore Brass Co., 1212 Wilcomico, Baltimore, Md.
Baltimore Copper Mills, (Div. of General Cable Corp.) Baltimore, Md.
Bohn Aluminum & Brass Corp., Detroit, Mich.
Bohnalite. See Bohn Aluminum & Brass Corp.
Bridgeport Brass Co., 774 E. Main, Bridgeport, Conn.
Buffalo Bronze Die Cast Corp., 100 Arthur, Buffalo, N. Y.
Dallas Brass & Copper Co., 820 Orleans, Chicago, Ill.
Durbar. See Buffalo Bronze Die Cast Corp.
Electric Materials Co., North East, Pa.
Federal-Mogul Corp., Shoemaker & Lillibridge Sts., Detroit,
Higgins Brass & Mfg. Co., 12435 Dequindre, Detroit, Mich.
Johnson Bronze Co., New Castle, Pa.
Michigan Copper & Brass Co., 5851 W. Jefferson Ave., Detroit, Mich.
Nickeloid. See American Nickeloid Co.
Plume & Atwood Mfg. Co., 474 Bank, Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Co., Seymour, Conn.
Taunton-New Bedford Copper Co., Taunton, Mass.
Titan Metal Mfg. Co., Bellefonte, Pa. (Rods and Forgings.)
Western Cartridge Co., East Alton, Ill.
BREAKERS, Circuit. See Circuit Breakers.
BRIDGES, Wheatstone. See Instruments, Laboratory Standard.
BRONZE. See Brass, Bronze and Copper; also Castings.
BRONZE, Phosphor. See Phosphor Bronze.
BRONZE POWDER, Aluminum. See Aluminum.
BRUSH HOLDERS. See Brushes, Commutator.
BRUSHES, Carbon. See Brushes, Commutator.
Graphite. See Brushes, Commutator.
Metal Graphite. See Brushes, Commutator.

BRUSHES, COMMUTATOR
(Brushes, Brush Holders and Flexible Leads.)
Brush Holders ..... See H
Carbon, Graphite, Metal Graphite ..... See C
Flexible Leads and Pig Tails ..... See L
Sheet Metal ..... See S
Wire Gauze ..... See W
Automotive Mfg. Co., Kansas City, Mo. ..... H
B. B. B. See Becker Bros. Elec'l Corp.

Evidence of Approval



The steadily growing demand for Newton Die Castings is convincing evidence of the approval which Newton Standards of Quality have earned. In automotive accessories, electrical appliances, office equipment, portable tools, and other specialty fields, Newton Die Castings are proving themselves dependable and economical. Nothing can take the place of Quality consistently maintained.

THE NEWTON DIE CASTING CORPORATION

146 MUNSON ST. NEWTON NEW HAVEN NEW HAVEN. CONN.

BRUSHES, Commutator—Continued
Baylis Co., Bloomfield, N. J. . . . . H . .
Becker Bros. Elec. Corp., 23 N. Jefferson, Chicago, Ill. . . . . C W S H L
Blanck & Carrier Corp., 115 W. 63rd, New York, N. Y. . . . . C . . . . . .
Boxill-Bruel Carbon Co., Columbia Park, O. C . . . . H . .
Calebaugh Self-Lubricating Carbon Co., 1503 Columbia Ave., Philadelphia, Pa. . . . . C . . . . . .
Carbon Engrg. Co., Slinger, Wis. . . . . C L
Carbon Laboratories Co., 5005 Euclid Ave., Cleveland, O. . . . . C . . . . . .
Carbon & Graphite Corp., 227 West Broadway, New York, N. Y. . . . . C . . . . . .
Carenco. See Carbon Engineering Co.
Chapin Co., Chas. E., 227 Fulton St., New York, N. Y. . . . . C W S . . L
Columbia Machine Wks. & M. I. Co., 363 Chestnut, Brooklyn, N. Y. . . . . H . .
Cooley Mfg. Co., 98 Park Place, New York . . W . . . . .
Diamond C. See Chapin Co., Chas. E.
Dixon Crucible Co., Joseph, Jersey City. . . . . .
Electra. See Automotive Mfg. Co.
Electric Accessories Co., 310 York Ave., Philadelphia, Pa. . . . . H .
Electro-Nite Carbon Co., 308 N. Fourth, Philadelphia, Pa. . . . . .
Eureka Metal Products Corp., 91 Clay, North East, Pa. . . . . W S H . .
Fleck Carbon Co., 508 Broome, New York C . . . . . .
General Electric Co., Schenectady, N. Y. . . C . . . . H .
Graphalloy. See Graphite Metalizing Corp.
Graphite Metalizing Corp., 1040 Nepperhan Ave., Yonkers, N. Y. . . . . C . . . . H . .
Hecrite Products Co., 98 Park Place, New York, N. Y. . . . . C . . . . . .
Holland Trolley Supply Co., 1623 E. 43rd, Cleveland, Ohio . . . . . H . .
Jeandron, W. J., 345 Madison Ave., New York, N. Y. (Imported.) . . . . . C . . . . . .
Keystone Carbon Co., 4638 N. 11th, Philadelphia, Pa. . . . . C . . . . . .
Kohlenite Products Co., 92-34 152nd St., Jamaica, N. Y. . . . . C . . . . . .
La Carbona. See Jeandron, W. J.
La Valley Vitae Carbon Brush Co., 4851 Grand Central Terminal, New York, N. Y. C . . . . . .
Marks Elec. Co., Hiram, 304 Woodward Ave., Detroit, Mich. . . . . C . . . . . .
Morganite Brush Co., 33-02 48th Ave., Long Island City, N. Y. . . . . C . . . . . .
National Carbon Co., Cleveland, O. . . . . C . . . . . .
New Process Carbon Co., 1503 Columbia Ave., Philadelphia, Pa. . . . . C L
No Spark. See Calebaugh Self-Lubricating.
Ohio Carbon Co., 5115 Almira Ave., Cleveland, Ohio . . . . . C W . . . L
Ohio Elec. Specialty Mfg. Co., Troy, O. . . W . . . . .
Perfection Supply Co., 98 Park Pl., New York, N. Y. . . . . C W S H L
Pittsburgh Carbon Brush Co., 127 Fancourt, Pittsburgh, Pa. . . . . C . . . . . .
Pure Carbon Co., Wellsville, N. Y. . . . . C W S . . L
Pyramid. See National Carbon Co.
Reaction. See Baylis Co.
Rome Wire Co., Div. of General Cable Corp., Rome, N. Y. . . . . W L
Salem Electrical Supply Co., Salem, Mass. . . W . . . . .
Snarr & Co., Geo. W., 110 S. Ninth, St. Louis, Mo. . . . . C . . . . . .
Spee-Dee Elec. Mfg. Co., 199 Lafayette, New York, N. Y. . . . . C L
Speer Carbon Co., St. Mary's, Pa. . . . . C . . . . . .
Stackpole Carbon Co., St. Mary's, Pa. . . . . C . . . . . .
Sterling. See Carbon Laboratories Co.
Superior Carbon Products Co., North Rd., Poughkeepsie, N. Y. . . . . C . . . . . .
U. S. Graphite Co., Saginaw, Mich. . . . . C . . . . . .
Universal. See Graphite Metalizing Corp.
Weber Elec. Wks., Brooklyn Sta., Cleveland. C L

BRUSHES, PNEUMATIC SPRAYING. See Spraying Outfits.

BRUSHES FOR VACUUM CLEANERS

Omaha Brush Co., 320 N. 15th, Omaha, Neb. (Brushes rebristled.)
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, Ohio.

BUGGIES, Armature. See Lifts, Armature.

BULBS, Glass

For Incandescent Lamps and Tubes.
Almo Mfg. Co., 38 Crawford, Newark, N. J.
Corning Glass Wks., Corning, N. Y.
Fayette Glass Bulb Co., 229 21st, Brooklyn, N. Y.
Libby Glass Co., Toledo, O.

BUNCHING MACHINES. See Wire Manufacturing Machines.

BUS BAR. See Brass, Bronze and Copper. Also Aluminum

BUSHINGS, SHAFT. See Bearings and Bushings.

BUSHINGS, Box and Cabinet, Porcelain

Appleton Electric Co., 1704 Wellington Ave., Chicago, Ill
Columbia Metal Box Co., 226 E. 144th St., New York, N. Y.
Harter. See Multi Elect. Mfg. Co.
Knox Porcelain Corp., Knoxville, Tenn.
Mineral'ac Electric Co., 25 N. Peoria, Chicago, Ill.
Multi Electric Mfg. Co. 210 N. Ogden Ave., Chicago, Ill.
Nelson Elec. Co., Plant City, Fla.

CABINET GRILL CLOTH. See Cloth, Untreated.

CABINETS, Fibre

Continental-Diamond Fibre Co., Bridgeport, Pa.
Vulcawood. See Continental-Diamond Fibre Co.

CABINETS, Refrigerator. See Refrigerator Cabinets.

CABINETS, Sheet Steel

Stamped and Turned-up Boxes and Cabinets.
Acme Blow Pipe & Sheet Metal Wks., New Orleans, La.
Adam Electric Co., Frank, St. Louis, Mo.

All-Steel-Equip. Co., Aurora, Ill.
American Metal Wks., 4868 Stanton Ave., Philadelphia, Pa.
American Steel Furniture Co., 27 W. 24th, New York, N. Y.
Aurora Steel Products Co., Aurora, Ill.
Benjamin Elec. Co., 1378 E. 16th, Los Angeles, Cal.
Berks Engineering Co., Reading, Pa.
Berthold Elec. Co., Gus, 551 W. Monroe, Chicago, Ill.
Bonnell Elec. Mfg. Co., 192 Chambers, New York, N. Y.
Chicago Hdwe. Foundry Co., North Chicago, Ill.
C. & P. Electric Wks., Springfield, Mass.
Cleveland Switchboard Co., 2925 E. 79th, Cleveland, O.
Coast Specialty Co., 73 E. Sixth, Portland, Ore.
Cole Metal Products Co., 33 Crescent, Long Island City.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Columbia Elec. Mfg. Co., 59 Columbus Sq., San Francisco, Cal.
Columbia Metal Box Co., 226 E. 144th, New York, N. Y.
Columbian Steel Tank Co., 1505 W. 12th, Kansas City, Mo
Commercial Mfg. & Supply Co., 1443 Delaware St., Denver.
Creiger Electrical Mfg. Co., 609 W. Lake, Chicago, Ill.
Diamond Elec'l Mfg. Co., 1330 E. 16th, Los Angeles, Cal.
Dowman-Dozier Mfg. Co., 1314 Murphy Ave., S. W., Atlanta, Ga.
Electric Apparatus Co., 704 N. Halsted, Chicago, Ill.
Electric Panelboard Co., 426 Exchange, Rochester, N. Y.
Federal Steel Products Co., 2 Ave. L, Newark, N. J. (Polarized Boxes.)
Fouch Elec. Mfg. Co., 105 N. Ninth, Portland, Ore.
Greater New York Metal Box Co., Inc., 143 W. 19th, New York.
Green Elec. Co., 31 N. Water, Rochester, N. Y.
Gurney Sheet Metal Wks., 718 E. 4th, Long Beach, Cal.
Hauer, J. B., Driggs Ave. and N. 11th, Brooklyn, N. Y.
Holzer Sheet Metal Wks., Inc., New Orleans, La.
Hough Mfg. Co., 2520 24th, Detroit, Mich.
Isert Co., J. H., 1234 Rowan, Louisville, Ky.
Karp Metal Products Co., 129 30th, Brooklyn, N. Y.
Kirtland Elec. Construction Co., 34 Herkimer, Albany, N. Y.
Large-Dail Mfg. Co., 406 Cherry St., Philadelphia.
Leonard Elec. Mfg. Co., 2907 Perkins Ave., Cleveland, O.
Lexington Elec. Products Co., 419 E. 24th, New York, N. Y.
Lorentzen, H. K., 155 Leonard, New York, N. Y.
MacMillen Mfg. Co., 1400 N. Spring, Los Angeles, Cal.
Mansfield Elec. Hardware Co., Longview Ave., Mansfield, O.
Metropolitan Elec. Co., 2914 First Ave., S., Seattle, Wash.
Metropolitan Elec. Products Co., Blvd. at 14th, Long Island City, N. Y.
Milwaukee Vault & Cabinet Co., 521 Market, Milwaukee.
Mosher, S. L., 1951 Lawrence, Denver, Colo.
National Metal Bax Co., Van Dyke & Ferris Sts., Brooklyn.
Newman Elec. & Mfg. Co., Eau Claire, Wis.
Par-Metal Products Corp., 3519 41st, Long Island City, N. Y.
Penn Electrical Co., 35 Water, Irwin, Pa.
Powerlite Switchboard Co., 4149 E. 79th, Cleveland, O.
Rezloh. See Holzer Sheet Metal Works.
Robbins & Myers, Inc., Springfield, O.
Security. See Aurora Steel Products Co.
Standard Metal Box Corp., 950 Grand St., Brooklyn, N. Y.
Star Metal Box Co., 238 46th, Brooklyn, N. Y.
Superior Switchboard & Devices Co., 420 Schroyer Ave., Canton, O.
Tanner & Co., Wm. F., 511 S. Sharp, Baltimore, Md.
United Metal Box Co., 473 President, Brooklyn, N. Y.
United Sheet Metal Wks., 575 Howard, San Francisco.
Universal Metal Box & Products Co., 316 Coit, Irvington, N. J.
Wadsworth Elec. Mfg. Co., Covington, Ky.
Wiegman & Co., E. M., 1908 Benton, St. Louis, Mo.
Wurdack Elec. Mfg. Co., 4444 Clayton Ave., St. Louis, Mo.

CABINETS AND BOXES, Wood

Accurate Molding Corp., 20 Morton, Brooklyn, N. Y.
Adler Mfg. Co., Louisville, Ky.
Adler Royal. See Adler Mfg. Co.
Ampere. See Donehue Lumber Co.
Art Woodworking Co., Inc., 1035 Seattle Blvd., Seattle, Wash.
Aston Cabinet Mfrs., 1223 W. Lake, Chicago, Ill.
Blackhawk Furniture Co., Rockford, Ill.
Boehm Cabinet Co., J., 2216 W. 63rd St., Cleveland, O.
Carlon. See Art Woodworking Co.
Carolina Wood Products Co., Asheville, N. C.
Carrom Co., Ludington, Mich.
Caswell-Runyon Co., Huntington, Ind.
Cary Cabinet Corp., 1427 N. 15th, St. Louis Mo.
Cheney Piano Action Co., A. C., Castleton, N. Y.
Chickasaw Furniture Mfg. Co., Memphis, Tenn.
Comrades Mfg. Co., 1942 N. Second, St. Louis, Mo.
Conner Furniture Co., New Albany, Ind.
Continental Radio Corp., East Pontiac, Extended, Fort Wayne, Ind.
Corbett Cabinet Mfg. Co., St. Mary's, Pa.
Cory Cabinet Corp., Springfield, Mo.
Dekker Co., Geo., Henderson, Ky.
Ebert Furniture Co., 225 W. 24th, New York, N. Y
Edein & Sons, Frederick, 44 Central Ave., Brooklyn, N Y.
Empire-United Hat Block Co., 312 E. 22nd, New York.
Estes & Sons, E. B., 5844 Grand Central Terminal Bldg., New York, N. Y.
Excel Phonograph Mfg. Co., 400 W. Erie, Chicago, Ill.
Excello Products Corp., 4836 W. 16th, Cicero, Ill.
Federal Wood Products Corp., 206 Lexington Ave., New York, N. Y.
Findlay Mfg. Co., Metropolitan & Morgan Aves., Brooklyn.
Grand Rapids Furniture Co., Grand Rapids, Mich.
Harper Mfg. Co., Cassopolis, Mich.
Hickory Box Co., Hickory, N. C.
Hubbell, H. L., 59 Market Ave., N. W., Grand Rapids.
Interstate Woodworking Co., 46 Wooster, New York, N. Y.
Karpen. See Stuginer Bros.
Kiel Furniture Co., 32nd and Center Sts., Milwaukee, Wis (Radio Table)
King Mfg. Corp., 254 Rano, Buffalo, N. Y.
Klumpp Sons, John G., 13 Baxter, New York, N. Y.
Knoxville Table & Chair Co., Knoxville, Tenn.
National Cabinet Co., New Philadelphia, O.
New England Box Co., Greenfield, Mass.
Ohio Valley Cabinet Co., Wheeling (Warwood), W. Va.
Oneida Cabinet Corp., Oneida, N. Y.
Ottawa Furniture Co., Holland, Mich.
Pooley Co., 16th & Indiana Ave., Philadelphia, Pa.
Radio Allied Mfrs. Corp., 1340 S. Michigan Ave., Chicago.

Radio Cabinet Mfg. Corp., Furniture Mart, Chicago, Ill.
Radio Cabinet & Equipment Co., 1504 Vine, Philadelphia.
Radio Mfg. Co., Div. of Pillied Lumber Co., Swanton, O.
Radio Master Corp., Bay City, Mich.
Red Lion Cabinet Co., Red Lion, Pa.
R. E. Z. Cabinet Co., 54 North, Boston, Mass.
Schutz Bros., 152 Chambers, New York, N. Y
Showers Bros. Co., Bloomington, Ind.
Signal Elec. Mfg. Co., Menominee, Mich.
Southern Toy Co., Hickory, N. C.
Specialty Display Case Co., Kendallville, Ind.
Starr Piano Co., Richmond, Ind.
Stettner Phonograph Corp., 669 Kent Ave., Brooklyn, N. Y.
Studner Bros., 67 W. 44th, New York, N. Y.
Superior Cabinet Corp., 206 Broadway, New York, N. Y.
Syracuse Screen & Grille Co., North Manchester, Ind.
Tessier Bros., 355 Bridge, Northampton, Mass. (Radio.)
Trenton Wood Specialty Co., Stokes Ave. and P. R. R. Trenton, N. J.
Udell Wks., 28th and Barnes Ave., Indianapolis, Ind.
United Reproducers Corp., 25 Leighton Ave., Rochester, N. Y.
West Box Co., 235 Liberty, Springfield, Mass
Wood Cabinet Corp., 196 Lexington Ave., New York,, N. Y.

CABLE ARMORING MACHINES. See Wire Manufacturing Machines.

CABLE TEST SETS. See Instruments, Portable and Switchboard.

CABLING MACHINES. See Wire Manufacturing Machines.

CANDLES, Fixture

Glass, Fibre Paper.
Brandywine Fibre Products Co., 1402 Walnut, Wilmington.
Cleveland Container Co., 10619 Berea Rd., Cleveland, O.
Fibre Products Co., New Bedford, Mass.
Franklin Fibre Specialty Co., 173 Lafayette, New York, N.Y.
Phoenix Glass Co., Monaca, Pa.
Remington Mfg. Co., 939 Barnum Ave., Bridgeport, Conn.
Seamless. See Fibre Products Co.

CANOPY (Canopies). See Fixture Fittings.
Insulators. See Insulators.
Switches. See Switches, Snap.

CAPACITORS, RADIO. See Radio Circuit Components.

CARBON, Powdered

Marks Elec. Co., Hiram, 304 Woodward Ave., Detroit, Mich.

CARBONS, Battery. See Carbons.
Arc Light. See Carbons.

CARBONS

Battery Arc Light.
Becker Bros. Elect. Corp., 23 N. Jefferson, Chicago, Ill.
Blanck & Carrier Corp., 115 W. 63rd, New York, N. Y.
Columbia. See National Carbon Co.
Daylight. See National Carbon Co.
Lessing Battery. See Blanck & Carrier Corp.
Nuernberg Battery. See Blanck & Carrier Corp.
National Carbon Co., Cleveland, Ohio.
Oretip. See National Carbon Co.
Silvertip. See National Carbon Co.
Speer Carbon Co., St. Mary's, Pa.
Stackpole Carbon Co., St. Mary's, Pa.

CARTONS. See Boxes and Wrappers.
CASEIN PLASTICS. See Molded Insulation.
CASES, Eliminator. See Cases, Eliminator.
Flashlight. See Cases, Flashlight.

CASES, Eliminator

Brumberger Co., 252 Pearl, New York, N. Y.
Grand Sheet Metal Wks., 176 Grand, New York, N. Y.
Karp Metal Products Co., 129 30th, Brooklyn.

CASES, Flashlight

Bridgeport Brass Co., 744 E. Main, Bridgeport, Conn.
Lincoln Fibre Specialty Co., Newport, Del.
St. Louis Paper Can & Tube Co., St. Louis, Mo.
Underwood Battery Co., 1250 Ontario, Cleveland, O.

CASTINGS, Aluminum. See Castings, Aluminum. Also
Castings, Copper, etc.
Brass. See Castings.
Bronze. See Castings.
Copper. See Castings.
Die. See Castings, Die.
Monel Metal. See Castings.
Steel. See Castings, Steel.
White Metal. See Castings.

CASTINGS, Aluminum

Aluminum Co. of America, 2471 Oliver Bldg., Pittsburgh.
Bergen Point Brass Foundry, Bayonne, N. J.
Berks Foundry & Mfg. Co., West Hamberg, Pa.
Bohm Aluminum & Brass Corp., Detroit, Mich.
Bonnell Elec. Mfg. Co., 192 Chambers, New York, N. Y
Dick Bros., Inc., Reading, Pa.
Eureka Metal Products Corp., 91 Clay, North East, Pa.
Monarch Aluminum Ware Co., 9301 Detroit Ave., Cleveland,
National Bronze & Aluminum Foundry Co., 88th & Lake, Cleveland O.
Quality Aluminum Casting Co., Waukesha, Wis.
Tenual. See National Bronze & Aluminum Foundry Co
United Metal Mfg. Co., Inc., 25 Shipping, Norwich, Conn.
Veco Mfg. Co., South Norwalk, Conn.

CASTINGS

Copper, Brass, Bronze, Monel Metal, White Metal.
Anderson Mfg. Co., Albert & J. M., 289 A Boston Mass
Barnard Foundry Co., 9 Roseland, Springfield, Mass.
Bergen Point Brass Foundry, Bayonne, N. J.
Berks Foundry & Mfg. Co., West Hamberg, Pa.
Bohn Aluminum & Brass Corp., Detroit.
Bonnell Elec. Mfg. Co., 192 Chambers, New York, N. Y.
Bridgeport Castings Co., 250 North Ave., Bridgeport, Conn.
Central Pattern & Foundry Co., 3737 S. Sacramento Ave., Chicago, Ill.
Chase Brass & Copper Co., Waterbury, Conn.
Chicago Hardware Foundry Co., North Chicago, Ill.
Davis & Zuckerman, 514 E. 11th, New York, N. Y.
Delta Star Electric Co., 2437 Fulton, Chicago, Ill.
Dick Bros., Inc., Reading, Pa.
Eureka Metal Products Corp., 91 Clay, North East, Pa.
Faries Mfg. Co Decatur, Ill.
Federal-Mogul Corp., Shoemaker & Lillibridge Sts., Detroit,
Harsch, John, Bronze & Foundry Co., 11612 Madison Ave., Cleveland, O.
Johnson Bronze Co., New Castle, Pa.

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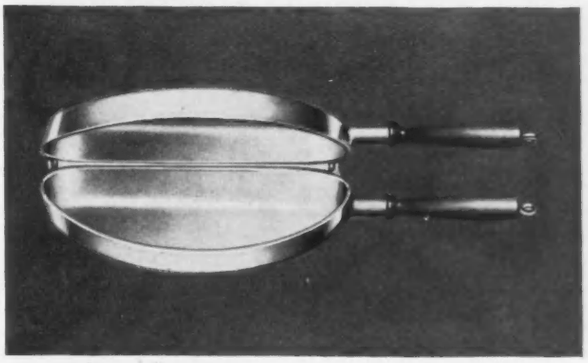

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McGill Metal Co., Valparaiso, Ind.
National Bronze & Aluminum Foundry Co., 88th & Lazy, Cleveland, O.
Ohio Pattern Wks. & Fdy. Co., 2730 Spring Grove Ave., Cincinnati, O.
Rabun Bronze Foundry, 617 West Belgrave, Huntington Park, Cal.
Sterling Art Metal Wks., 40 Purvis, Long Island City, N. Y.
Tenual. See National Bronze & Aluminum Foundry Co.
United Metal Mfg. Co., Inc., 25 Shipping, Norwich, Conn

CASTINGS, Die

Advance Tool & Die Casting Co., 1654 Holton, Milwaukee.
Alemite Die-Casting & Mfg. Co., Woodstock, Ill.
Allied Die-Casting Corp., Long Island City, N. Y.
Alumac. See Aluminum Co. of America.
Aluminum Co. of America, 2471 Oliver Bldg., Pittsburgh.
Aluminum Industries, Inc., 2438 Beekman, Cincinnati, O.
American Brass Co., Waterbury, Conn.
Anaconda. See American Brass Co.
American Die Casting Co., 2040 Dominick, Chicago, Ill.
Badger Die Casting Co., 156 East Buffalo, Milwaukee, Wis.
Barnhardt Bros. & Spindler, Monroe & Throop St., Chicago.
Bohn Aluminum & Brass Corp., Detroit, Mich.
Bohnalite. See Bohn Aluminum & Brass Corp.
Do-Di. See Doehler Die Casting Co.
Doehler Die Casting Co., 386 Fourth Ave., New York, N. Y.
Federal-Mogul Corp., Shoemaker & Lillibridge Sts., Detroit,
Franklin Die Casting Corp., 826 Gifford, Syracuse, N. Y.
Illinois Die Castings Co., 551 W. Congress, Chicago, Ill.
Krone-Seebek Die Casting & Mfg. Co., 2925 W. 47th, Chicago, Ill.
Milwaukee Die Casting Co., 293 Fourth, Milwaukee, Wis.
Newton Die Casting Corp., 146 Munson, New Haven Conn.
Paragon Die Casting Co., 2701 N. Crawford Ave., Chicago.
Perfection Die Casting Corp., 406 Lakeside Ave., N. W., Cleveland, O.
Permite. See Aluminum Industries, Inc.
Phoenix Die Castings Co., 21 Illinois, Buffalo, N. Y.
Pittsburgh Die Casting Co., 7508 Ardmore, Swissvale, Pa.
Stewart Die Casting Co., 4500 Fullerton Ave., Chicago, Ill.
Superior Die Casting Co., 875 E. 70th, Cleveland, Ohio.
Twin City Die Castings Co., Talmadge and 33rd Aves., S. E., Minneapolis, Minn. (White Metal).

CASTINGS, Gray Iron

American Engineering Co., Philadelphia, Pa.
Athens Foundry Co., Athens, Pa.
Barlow Foundry Co., 551 N. J. B. R. Ave., Newark, N. J.
Barnett Foundry Co., Newark, N. J.
Berks Foundry & Mfg. Co., West Hamberg, Pa.
Bonnell Elec. Mfg. Co., 192 Chambers, New York, N. Y.
Bridgeport Castings Co., 250 North Ave., Bridgeport, Conn.
Chicago Hardware Foundry Co., North Chicago, Ill.
Dick Bros., Inc., Reading, Pa.
Eastern Malleable Iron Co., Naugatuck, Conn.
Fairmount Foundry, Inc., Third & Westmoreland Sts., Philadelphia, Pa.
Farrel City-Walworth Run Fuondries Co., 2500 W. 27th, Cleveland, O.
Gray Iron Foundry Co., Reading, Pa.
Milwaukee Grey Iron Foundry Co., 3910 Mitchell, Milwaukee, Wis.
North Lebanon Foundry Co., Second & Canal, Lebanon, Pa.
North Wales Mach. Foundry Co., North Wales, Pa.
Products Machine Co., Bridgeport, Conn.
Sacks Iron Foundry, L., 357 Wilson Ave., Newark, N. J.
Snead & Co. Pine St., Jersey City, N. J.
Southern Malleable Iron Co., 21st St. and Bond Ave., East St. Louis, Ill.
St. Louis Malleable Castings Co., 7701 N. Conduit Ave., St. Louis, Mo.
Union Mfg. Co., New Britain, Conn.
Western Foundry Co., Kedzie Ave. at 36th, Chicago, Ill

CASTINGS, Steel

Bonney-Floyd Co., Columbus, Ohio.
Eastern Steel Casting Co., Ave. L & Edward St., Newark
Northwestern Steel & Iron Corp., 2907 Fourth, S. E., Minneapolis, Minn.
Pittsburgh Malleable Iron Co., Pittsburgh, Pa.
Procisn. See Northwestern Steel & Iron Corp.
Riverside Steel Casting Co., Jacobus Ave., Kearney, N. J

CEMENT, Commutator

Anchorlute. See Technical Products Co.
Commutator Companion. See Withington Div. of Marnot Co.
Conductalute. See Technical Products Co.
Early, Edward E., 1129 W. Fifth, N. W., Canton, O.
Fixkwick. See Technical Products Co.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Imperial. See Martindale Electric Co.
Martindale Elec. Co., 1262 W. Fourth, Cleveland, O.
Mitchell Rand Mfg. Co., 19 Vesey, New York, N. Y.
Perce-Lute. See Perfection Supply Co.

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Technical Products Co., Pittsburgh, Pa.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa
Withington Div. of Marnot Co., 50 Thayer, Boston, Mass.

CEMENT, Liquid Porcelain

Anchorlute. See Technical Products Co.
Fire Lute. See Technical Products Co.
Insa-Lute. See Technical Products Co.
Okonite Co., Passaic, N. J.
Patch-O-Namel. See Technical Products Co.
Repairet Mfg Co. Milwaukee, Wis.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.
Technical Products Co., Pittsburgh, Pa.
Thermold. See Technical Products Co.
CHAIN, Chandelier (Fancy). See Crystals, Chandelier.
CHAIN DRIVES. See Chain, Power Transmission

CHAIN, Fixture

Acco. See American Chain Co.
American Chain Co., Bridgeport, Conn.
Chase Brass & Copper Co.
Eastern Chair Works, 309 E. 22nd St., New York, N. Y.
Farles Mfg. Co., Dechtur, Ill.
Globe Metal Mfg. Co., 2122 E. Hazard, Philadelphia, Pa
H. & O. Chain Co., So. Norwalk, Conn.
Newark Metal Mfg. Co., 22 S. 6th, Newark, N. J.
Plume & Atwood Mfg. Co., Waterbury, Conn.
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Steele & Johnson Mfg. Co., Waterbury, Conn.
Universal Metal Chain Co., 75 Clymer, Brooklyn, N. Y.

CHAIN, Power Transmission

Baldwin Chain & Mfg. Co., Worcester, Mass.
Boston Gear Wks Sales Co., Norfolk Downs, Mass.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Link-Belt Company, 910 S. Michigan Ave., Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.
Ramsey Chain Co., Inc., Albany, N. Y.
Reeves Pulley Co., Columbus, Ind.
Renold Boston. See Boston Gear Wks.
Union Chain & Mfg. Co., Sandusky, O.
Whitney Mfg. Co., Hartford, Conn.

CHAIN, Socket

American Ball Chain Works, 12 Wooster St., New York.
Bead Chain Mfg. Co., Bridgeport, Conn.
H. & O. Chain Co., South Norwalk, Conn.
CHANDELIER BEADS. See Crystals, Chandelier.
CHANDELIER CRYSTALS. See Crystals, Chandelier.
CHANDELIER FRINGE. See Crystals, Chandelier.

CHARGERS, Magnet

Charging, Remagnetizing.
Colpin Corp., 6110 S. Main, Los Angeles, Cal.
Cowie Elec. Co., E. S., 1823 Wyandotte, Kansas City, Mo.
Fore Elec. Mfg. Co., 5255 Wabada Ave., St. Louis, Mo.
Scintilla Magneto Co., Inc., Sidney, N. Y.
Serverell Sales Corp., 1749 N. Winchester Ave., Chicago.
Valley Electric Co., 4721 Forest Park Blvd., St. Louis, Mo.

CHEMICALS, Battery

Electrolyte, Battery Salts, Battery Oxides, Sal Ammoniac, Bluestone, Manganese.
Cooper & Co., Charles, 194 Worth, New York, N. Y.
Eagle-Picher Lead Co., 134 N. LaSalle, Chicago. (Oxide.)
Elmer & Amend, 205 3rd Ave., New York, N. Y.
Electrex. See Goodyear Chemical Co., Inc.
Electro Chemical Co., 113 W. Court St., Dayton, O.
General Metallic Oxides Co., Jersey City, N. J.
Globe Chemical Co., Murray Rd. and Big Four R. R., Cincinnati, O.
Goodyear Chemical Co., Inc., 20 W. 22nd, New York, N. Y.
Grasselli Chemical Co., Guardian Bldg., Cleveland, O.
Kalbfleisch Corp., 200 5th Ave., New York, N. Y.
Klipstein Co., 644 Greenwich, New York, N. Y.
Merriman Chemical Co., 148 State, Boston, Mass.
Powers-Weightman-Rosengarten Co., Philadelphia, Pa.
Voltah. See Powers-Weightman-Rosengarten Co.
Wah Chang Trading Corp., 233 Broadway, New York, N. Y.

CHEMICALS, Refrigeration

Ansul Chemical Co., Marinette, Wis.
Arctic. See Roessler & Hasslacher Chemical Co.
Carbide & Carbon Chemicals Corp., 30 E. 42nd, New York, N. Y. (Butane & Isobutane.)
Dry Ice Corp. of America, 50 E. 42nd, New York, N. Y.
Roessler & Hasslacher Chemical Co., 709 Sixth Ave., New York, N. Y (Methyl Chloride, Ethyl Chloride.)
Virginia Smelting Co., West Norfolk, Va. (Sulphur Dioxide.)
Chromium Plating. See Plating & Finishing.

CHUCKS, Magnetic

J & H Elec. Co., 161 Clifford, Providence, R. I.
Simmons. See Taft-Pierce Mfg. Co.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Walker Co., O. S (Rockdale), Worcester, Mass.

CIRCUIT BREAKERS

Air and Oil Circuit Breakers and Oil Break Switches.
Allen-Bradley Co., 494 Reed, Milwaukee, Wis.
Anderson Mfg Co., Albert & J. M., 239 A, Boston, Mass.
Automatic Reclosing Circuit Breaker Co., Columbus, O.
Automatic Switch Co., 517 E. Larned, Detroit, Mich.
Burke Controller Co., 369 Lexington Ave., New York, N. Y
Cemdits Elec'l Mfg. Corp., 838 Summer St. (South Boston), Boston, Mass.
Cramblett Engineering Div. of Time-O-Stat Controls Co., 286 Milwaukee, Milwaukee, Wis.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
General Electric Co., Section W-234, Bridgeport, Conn.
Hart & Hegeman Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Hartman Electrical Mfg. Co., 31 E. Fifth, Mansfield, Ohio.
High Tension Elecl. Specialty Co., 500 Washington, Abington, Mass.
Hitsco. See High Tension Elecl. Specialty Co.
H. & H. See Hart & Hegeman Div.
Inducto-therm. See Allen-Bradley Co
I. T. E. Circuit Breaker Co., 19th and Hamilton Sts., Philadelphia, Pa.

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156 East Buffalo St., Milwaukee, Wis.

Laine Material Co., South Milwaukee, Wis. (Oil Switches.)
Maple Co., R. H., Indianapolis, Ind.
Martindale Elec. Co., 1262 W. Fourth, Cleveland, O.
Minibraker. See Burke Controller Co.
Moller-Smith Co., 239 Broadway, New York, N. Y.
Sentinel. See Westinghouse Elec. & Mfg. Co.
Takamine Corp., 208 Rawson, Long Island City, N. Y.
Tri-Re-Lite. See I. T. E. Circuit Breaker Co
Westinghouse Elec. & Mfg. Co., East Pittsburgh Pa
CIRCUIT TESTERS. See Testers, Fuse and Circuit
CLEANER BAGS, Vacuum. See Bags, Vacuum Cleaner
CLEANER BRUSHES, Vacuum. See Brushes for Vacuum Cleaners.

CLEANERS, Metal

Oakite Products, Inc., 26 Thames, New York, N. Y
CLIPS, Fuse. See Fuse Clips.

CLIPS, Heater Plug

Gray Bros. Co., Plano, Ill.
CLOCK SWITCHES. See Switches, Time.
CLOTH GEARS. See Gears and Pinions, Composition.
CLOTH LOUD SPEAKER DIAPHRAGM. See Cloth, Untreated.
CLOTH RADIO GRILL. See Cloth, Untreated.

CLOTH, Untreated

Doyle & Co., John, 112 Duane, New York, N. Y.
Canvas, "Aeroplane Cloth," Cotton Duck, Drill, Diaphragm Cloth, Grill Fabrics, etc.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Tindall Fabrics Corp., 200 Madison Ave., New York, N. Y. (Grill Cloth).

CLOTH AND PAPER, Insulating

Cloth, Insulated	See C							
Paper, Insulated	See P							
Fibre Paper (Fish Paper)	See F							
Press Board (Fuller Board)	See B							
Silk	See S							
Acme Wire Co., New Haven, Conn.	C	S	P					
Armco. See Rogers Paper Mfg. Co.								
Armatite. See Mica Insulator Co.								
Behr-Manning Corp., Troy, N. Y.				P				
Brand & Co., William, 248 4th Ave., New York				P				
Campbellite. See National Vulcanized Fibre Co.								
Carboloid Products Corp., 15 Park Row, New York, N. Y.	C			P				
Case Brothers, Inc., Highland, Park, Conn.				P				B
Case Mfg. Co., Unionville, Conn.				P				
Case & Risley Press Paper Co., Oneco, Conn.								
Celoron Co., Bridgeport Pa.					F	F		B
C-F. See National Vulcanized Fibre Co.								
Chicago Mica Co., 345 Campbell, Valparaiso, Ind.	C							
Columbian Rope Co., Auburn, N. Y.				P				
Continental-Diamond Fibre Co., Bridgeport, Pa.				P				
De Jonge & Co., Louis, 69 Duane, New York, N. Y. (Condenser)				P				
Dexstar. See Dexter & Sons.								
Dexter & Sons, C. H., Windsor Locks, Conn. (Condenser Tissue.)								
Dielectric Mfg. Co., St. Louis, Mo.	C	S	P					B
Electrite. See West Virginia Pulp & Paper Co.								
Fybervid. See Wilmington Fibre Specialty Co.								
General Electric Co., Merchandise Dept., Bridgeport, Conn.	C			P				
Glassine Condenser Tissue).	C			P				
Hartford City Paper Co., Hartford City, Ind.								
Hewitt & Bros., C. B., 16 Ferry, New York	C			P				
Hi-Tex See Stevens Paper Mills.								
Hollingsworth & Vose Co., 333 Washington, Boston, Mass.				P				
Incolia. See Tarentum Paper Mills Co.								
Irvington Varnish & Insulator Co., Irvington, N. J.	C	S	P					
Manning Paper Co., J. A., Troy, N. Y.								B
Mica Insulator Co., 200 Varick, New York	C	S	P					B
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.				P				
National Vulcanized Fibre Co., Wilmington, Del.					F			
New Jersey Wood Finishing Co., Woodbridge, N. J.	C							
Ohmoid. See Wilmington Fibre Specialty Co.								
Old Hick. See Hewitt & Bros., C. B.								
Peerless. See National Vulcanized Fibre Co.								
Riegels. See Warren Mfg. Co.								
Rogers Fibre Co., 210 Lincoln, Boston, Mass.					F			
Rogers Paper Mfg. Co., So. Manchester, Conn.								B
Schweitzer, Inc., Peter J., 200 Fifth Ave. New York, N. Y. (Condenser Tissue.)								

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Transfer Switches
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Sundh Electric Co., Inc.
Newark, N. J.

CLOTH AND PAPER, Insulating—Continued
Stco. See Standard Insulation Co.
Standard Insulation Co., East Rutherford, N. J. ..... C S P . . . .
Sterling Fireboard Co., 501 Fifth Ave., New York. (Varnished Hard Fibreboard) ..... B
Sterlite. See Sterling Firebrand Co.
Stevens Paper Mills, Windsor, Conn. ..... B
Tarentum Paper Mills Co., Tarentum, Pa. ..... P . . .
Turbonite. See Brand & Co., Wm.
Union Mills Paper Mfg. Co., New Hope, Pa. ..... P . . .
Warren Mfg. Co., 342 Madison Ave., New York, N. Y. ..... P . . . .
West Virginia Pulp & Paper Co., 230 Park Ave., New York ..... B
Wilmington Fibre Specialty Co., Wilmington, Del. ..... P . . .

CLUTCHES, Magnetic
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis

COIL (Coils).
Armature and Field. See Coils, Finished.
Choke (Radio). See Radio Circuit Components.
Driers & Impregnators. See Ovens.
Electromagnet. See Coils, Finished.
Flatteners. See Rolls, Coil Flattening.
High Frequency. See Electro-Therapeutic; also Radio Circuit Components; also Ignition Outfits.
Impregnators, Vacuum. See Ovens, Industrial.
Induction. See Coils, Finished; also Electro-Therapeutic
Loop Benders. See Benders, Coil Loop.
Medical. See Electro-Therapeutic.
Presses. See Presses, Armature Coil.
Radio. See Radio Circuit Components.
Removers. See Removers, Coil.
Resistance. See Units, Rods & Grids; also Radio Circuit Components.
Shaping Machines. See Shaping Machines, Coil.
Spark. See Ignition Outfits.
Spreaders. See Winding Machines, Armature and Field.
Tamping Tools. See Tools, Coil Tamping.
Taping Machines. See Taping Machines, Coil.
Testers. See Testers, Coil; also Test Benches, Armature
Winders, Armature & Field Coil. See Winding Machines Armature & Field Coil.
Winders, Induction Coil. See Winding Machines, Industrial Coil.
Winding Forms. See Forms, Coil Winding.
Windings (Magneto). See Coils, Finished.
Wire Tension Devices. See Tension Devices, Coil Wire

COILS, Finished
Armature, Field, Electromagnet and Induction Coils.
Acme Products Co., Boston, Mass.
Acme Wire Co., New Haven, Conn.
Aero-Call. See Aero Products, Inc.
Aero Products, Inc., 4611 Ravenswood Ave., Chicago, Ill.
Auth Electrical Specialty Co., 422 E. 53rd St., New York
A. & A. See Electrical Coil Winding Co.
Belden Mfg. Co., 2310B S. Western Ave., Chicago, Ill.
Bunnell & Co., J. H., 32 Park Place, New York, N. Y
Burke Controller Co., 369 Lexington Ave., New York, N. Y
Cameron Elec. Mfg. Co., Ansonia, Conn.
Cote Coil Div. of Universal Winding Co., Providence, R. I.
Ditmar Elec. Co., Brookline, Mass.
Dudlo Mfg. Co., Div. of General Cable Corp., Fort Wayne.
Easton Coil Co., Easton, Pa.
Electric Heat Control Co., 5902 Carnegie Ave., Cleveland, O
Electric Valve Mfg. Co., 68 Murray, New York, N. Y.
Electrical Coil Winding Co., 2735 Saunders, Camden.
Electrical Products Mfg. Co., Providence, R. I.
Fredericks Co., H. M., Lock Haven, Pa.
Globe Technilan Corp., Reading, Mass.
Herald Electric Co., 29 East End Ave., New York, N. Y
Inca Mfg. Co., Fort Wayne, Ind.
Marion Elec. Mfg. Co., 24 Cliff, Jersey City, N. J.
Modern Elec Mfg. Co., 312 Mulberry, Toledo, Ohio.
National Elec. Corp., 228 High, Newark, N. J.
Pifer Elec. Repair & Mfg. Co., 3810 Superior Ave., Cleveland, O.
Polymet Mfg. Co., 829 E. 134th St., New York, N. Y.
Reisner Mfg. Co., W. H., Hagerstown, Md.
Robertson-Davis Co. 361 W. Superior, Chicago, Ill
Robertson, Leo F., Inc., 532 West 22nd St., New York.
Rome Wire Co. (Div of General Cable Corp.), Rome, N. Y
Sevisor Magneto Engrg Co 397 Phillips, Toledo, O.
States Co., 19 New Park Ave., Hartford, Conn.
Stuns & Barron, 210 E. Pratt, Baltimore, Md.
Toledo Standard Commutator Co. 2242 Smead Ave., Toledo.
Varley Duplex Magnet Co., 15 Exchange Place, Jersey City, N. J. (Electromagnetic only).

COMMUTATOR
Bars. See Bars, Commutator.
Cement. See Cement, Commutator.
Dressers. See Stones, Commutator.
Lubricants See Compounds, Commutator.
New. See Commutators.
Refilled. See Repairing and Second Hand.
Slotters. See Slotting Machines & Tools, Commutator
Slotting Files. See Files, Commutator Slotting
Soldering Machines. See Soldering Machines, Commutator
Stones. See Stones, Commutator.
Tighteners. See Tighteners, Commutator.
Truing Devices. See Tools, Commutator Truing

COMMUTATORS
Cameron Electric Mfg. Co., 205 Main, Ansonia, Conn.
Derby Commutator Co., Derby, Conn
Electric Materials Co., North East, Pa.
Eureka Metal Products Corp., 91 Clay, North East, Pa.
Homer Commutator Co., 4748 Hough Ave., Cleveland.
Toledo Standard Commutator Co., Toledo, O.

COMMUTATOR BRUSHES. See Brushes, Commutator
COMPOSITION PULLEYS. See Pulleys, Composition

COMPOUNDS, Commutator
Allen Co., Inc., L. B., 6750 Bryn Mawr Ave., Chicago, Ill.
Armstrong. See Elec. Power Maintenance.
Consistency. See Warren Lubricant Co.
Cramolin, Inc., 25 W. 43rd St., New York, N. Y.
Dixon Crucible Co., Jos., Jersey City, N. J.
Doe & Co., Walter S., Kent, Ohio.
Gales. See McLennan & Co.
Goldmark Co., James, 83 Warren, New York, N. Y.
Kester Solder Co., 4210 Wrightwood Ave., Chicago, Ill.
McLennan & Co., K., 1751 West 35th, Chicago.
Perfection. See Warren Lubricant Co.
Sanderson. See Warren Lubricant Co.
Spermo. See Warren Lubricant Co.
Trotters. See Goldmark Co., James.
Warren Lubricant Co., 22 Maurice, Buffalo, N. Y.

COMPOUNDS, Sealing. See Wax and Compounds.

CONDENSER UNITS, Refrigerator
Bush Mfg. Co., Hartford, Conn.
McCord Radiator & Mfg. Co., Riopelle & E. Grand Ave. Detroit, Mich.
Rome-Turney Radiator Co., Rome, N. Y.

CONDENSERS, Radio. See Radio Circuit Components.
CONDENSER TUBING. See Tubing, Brass and Copper

CONNECTORS, Pin-Plug
Kliegl Bros. Universal Electric Stage Ltg. Co., 321 W. 50th, New York, N. Y.

CONNECTORS, Wire
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill. (Solderless-Tapeless).

CONTACT POINTS. See Points, Contact.
CONTAINERS, Shipping. See Fibre Board Products.

CONTROLLERS, Motor
Aclinestor. See Sundh Elec. Co.
Allen-Bradley Co., 494 Reed, Milwaukee, Wis.
Anderson & Co., C. J., 53 W. Jackson Blvd., Chicago, Ill.
Automatic Switch Co., 154 Grand, New York, N. Y.
Betts, Inc., James H., 1393 Sedgwick Ave., New York, N. Y. (Traffic.)
Burke Controller Co., 369 Lexington Ave., New York, N. Y.
B-Q Oil Burner Co., Stockton, Cal.
Clark Controller Co., 1146 E. 152nd, Cleveland, O.
Condit Elec'l Mfg. Corp., 838 Summer St. (South Boston), Boston, Mass.
Cutler-Hammer Mfg. Co., 1288 St. Paul Ave., Milwaukee.
Diamond Elecl. Mfg. Co., 1330 N. 16th, Los Angeles, Cal.
Dinkey. See Elec. Controller & Mfg. Co.
E C & M Youngstown. See Electric Controller & Mfg. Co.
Electric Controller & Mfg. Co., 2700 E. 79th, Cleveland, O.
Electrite. See Sundh Elec. Co.
Hercules. See Union Elec. Mfg. Co.
General Electric Co., Schenectady, N. Y.
Horni Signal Mfg. Corp., 515 Greenwich, New York.
Industrial Controller Div. of Square D Co., S. Pierce & Hanover, Milwaukee, Wis.
Maimin Speed Control Corp., 251 W. 19th, New York. (Sewing Machines.)
Monitor Controller Co., 51 Gay, Baltimore, Md.
National Electric Controller Co., 5315 Ravenswood Ave., Chicago, Ill.
Refrigerating Specialties Co., 728 S. Sacramento Blvd. Chicago, Ill.
Resisto. See Allen-Bradley Co.
Rowan Controller Co., 306 N. Holliday, Baltimore, Md.
Square D Co., 6060 Rivard, Detroit, Mich.
Sundh Elec. Co., Parkhurst St. at Ave. C, Newark, N. J.
Switcholone. See Condit Elec. Mfg. Co.
Thermaload. See Monitor Controller Co.
Trumbull Electric Mfg. Co., Plainville, Conn.
Uemco. See Union Elec. Mfg. Co.
Uneleo. See Union Elec. Mfg. Co.
Union Elec. Mfg. Co., 634 Juneau Ave., Milwaukee, Wis.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
W. K. See Westinghouse Elec. & Mfg. Co.

COPPER. See Brass, Bronze and Copper; also Castings
COPPER TUBING. See Tubing, Brass and Copper
CORD TIPS. See Tips, Cord.
CORD, Tinsel. See Tinsel Cord & Thread.

CORDS, Extension
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.

CORES, RESISTANCE COIL (Lava)
American Lava Corp., 1425 William, Chattanooga, Tenn
Crescent. See M. Kirchberger & Co.
Ea-El-Co. See Southern Lava Co.
Kirchberger & Co., M., 1425 37th, Brooklyn, N. Y.
Lavite. See Steward Mfg. Co.
Lavarock. See M. Kirchberger & Co.
Southern Lava Co., Rossville, Ga.
Steward Mfg. Co., D. M., Chattanooga, Tenn.
Tennessee Burner Mfg. Co., Chattanooga, Tenn.
XL. See Tennessee Burner Mfg. Co.

CORES, RESISTANCE COIL (Refractory Porcelain)
American Lava Corp., 1425 William, Chattanooga, Tenn.
Colonial Insulator Co., Akron, O.
Crowley & Co., Henry L., 545 N. Arlington Ave., East Orange, N. J.
Electrical Refractories Co., East Palestine, O.
Elemite. See Louthan Mfg. Co.
Firelte. See Hartford Faience Co.
Hartford Faience Co., Hartford, Conn.
Louthan Mfg. Co., E. Liverpool, O.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.
Thermal Syndicate, 58 Schenectady Ave., Brooklyn, N. Y.
Vitrecsil. See Thermal Syndicate.
Woolley, Inc., W. Douglas, East Liverpool, O.

COTTON DUCK. See Cloth, Untreated.
COTTON SLEEVING. See Tape, Cotton.
COUNTERS, Revolution. See Tachometers.

COUPLINGS, Shaft (Flexible-Insulated)
Ajax Flexible Coupling Co., Westfield, N. Y.
Bartlett Hayward Co., Baltimore, Md.
Bond Co., Charles, 617 Arch, Philadelphia, Pa.
Brown Engineering Co., 123 N. Third, Reading, Pa.
Falk Corp., Milwaukee, Wis.
Delbee Rubber Co., Syracuse, N. Y.
Francke. See Smith & Serrell.
General Electric Co., Schenectady, N. Y.
Grundy. See Bond Co.
Kanti Lever. See Brown Engineering Co.
Krone-Seebek Die Casting & Mfg. Co., 2935 W. 47th, Chicago, Ill.
Lipe, W. C., Syracuse, N. Y.
Lovejoy Tool Wks. 325 W. Ohio, Chicago, Ill.
Mather. See Bond Co.
Nuttall Wks., of Westinghouse Elec. & Mfg. Co., McCandless Ave. & Harrison St., Pittsburgh, Pa.
Oneida. See Delbee Rubber Co.
Smith & Serrell, 5 Halsey, Newark, N. J.
Webster Mfg. Co., 1856 N. Kostner Ave., Chicago, Ill.
Wood's Sons Co., T. B., Chambersburg, Pa.

COVERING MACHINES, WIRE. See Wire Manufacturing Machines.

CUPS, Grease
Rogers Products Corp., Auburn, New York.
Gits Bros. Mfg. Co., 1940 S. Kilbourn Ave., Chicago, Ill.
Lunkenheimer Co., Cincinnati, Ohio.

CUPS, Oil
Gits Bros. Mfg. Co., 1940 S. Kilbourn Ave., Chicago, Ill.

CUT OUTS, Battery. See Switches, Battery.

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CUTTING OUTFITS, Metal. See Welding and Cutting Outfits.
CRANES, Floor. See Lifts, Armature.

CRYSTALS, Chandelier
Crystals, Prisms, Beads, Chains, Fringes.
Crystal Venezia. See Harrison & Co., Arthur.
Fosilite. See Harrison & Co., Arthur.
Friedlaender Co., 49 W. 23rd, New York, N. Y.
Harrison & Co., Arthur, 561 W. Washington Blvd., Chicago.
Hirschberg, Shutz & Co., 268 4th Ave., New York, N. Y (Fringes.)
Nelson Bead Co., 15 W. 37th, New York, N. Y. (Importer.)
Rialto Import Co., 112 W. 4th, New York, N. Y.
Schwartz Lighting Fixture Wks., 1341 Noble, Philadelphia
Wyle & Bros., J. J., 20 E. 27th, New York, N. Y.

CURRENT INDICATORS. See Instruments, Pocket.
DASHBOARD METERS. See Instruments, Portable and Switchboard.

DECALCOMANIA
Meyercord Co., 120 S. La Salle, Chicago, Ill.
Novar. See Palm Fechteler & Co.
Palm Fechteler & Co., 67 5th Ave., New York, N. Y

DIALS
Radio (Metal). See Radio Mountings.
Radio (Molded). See Radio Molded Parts
Enameled. See Dials, Enameled.

DIALS, Enameled
Whittier Co., Horace R., Pequabuck, Conn.

DIAPHRAGM, Cloth. See Cloth, Untreated.
DIE CASTINGS. See Castings, Die.
DIE MAKERS. See Dies, Die Makers.

DIE SETS
Baumbach Mfg. Co., 1810 Kilbourn Ave., Chicago, Ill.
Danly Machine Specialties, Inc., 2104 S. 52nd Ave., Chicago, Ill.

DIES, Pipe. See Stocks, Dies and Reamers.

DIES, DIE MAKERS
Beaver Mfg. Co., 625 N. Third, Newark, N. J.
Caldbeck Tool & Mfg. Co., 307 East Third, Des Moines, Iowa.
Eureka Tool & Machine Co., 42 Walnut, Newark, N. J.
Kuhn & Jacob Machine & Tool Co., 502 Prospect Ave., Trenton, N. J.
Mareck & Nebel, 255 Greenwich, New York, N. Y.

DISCS, Armature
Steel Discs, Laminations, and Segments for Motors and Transformers.
American Stamping Co., 978 E. 64th, Cleveland, O.
Cleveland Armature Works, 4732 St. Clair Ave., Cleveland
Hercules Elec. Steel Corp., 145 Lafayette, New York, N. Y
Lamination Stamping Co., 744 Windsor, Hartford, Conn
Niagara Machine & Tool Wks., 637 Northland, Buffalo
Valley Appliances, Inc., 634 Lexington Ave., Rochester N. Y.
Willor Mfg. Corp., 117 Mercer, New York, N. Y.

DRAWING MACHINES, WIRE. See Wire Drawing Mach.
DRIVE SCREWS. See Screws, Drive.
DRIVES, CHAIN. See Chain, Power Transmission.

DYNAMOMETERS
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Clark Controller Co., 1146 E. 152nd, Cleveland, O.
Diehl Mfg. Co., Elizabeth, N. J.
General Electric Co. Schenectady.

EBONITE. See Rubber, Hard.
ELECTROLYTE. See Chemicals, Battery.
ELECTROMAGNETS. See Coils, Finished.

ELECTRODES FOR GAS SIGNS
American Neon Sign Corp., 549 W. 132nd St., New York.
Elsler Electric Corp., 756 S. 13th, Newark, N. J.
Machlett & Son, 46 William, Long Island City, N. Y.
Manhattan Elecl. Supply Co., 510 Sixth Ave., New York.
Q. R. S. De Vry Corp., 333 N. Michigan Ave., Chicago.

ELECTRODYNAMOMETERS. See Instruments, Laboratory Standard.
ELEMENTS, Heating. See Units, Rods and Grids.

ENAMELING MACHINES (For Magnet Wire)
(See Also Wire Manufacturing Machines).
American Insulating Machinery Co., 519 Huntington Ave., Philadelphia Pa.
Sleeper & Hartley, Inc., 335 Chandler, Worcester, Mass

ENGRAVING MACHINES
Portable Bench and Pedestal Outfits for Marking Metal.
Brewster Co., Wm., 30 Church, New York, N. Y.
Deckel. See Preis & Co., Inc., H. P.
Elsler Electric Corp., 756 S. 13th, Newark, N. J. (Tube Base Branders)
Engravograph Corp., 12 Vestry, New York, N. Y.
Etchograph. See Brewster Co., Wm.
Gilbert Supply Co., Independence, Iowa
Gorton Machine Co., Geo., Racine, Wis.
Preis & Co., Inc., H. P. Newark, N. J.
Schmidt, Inc., Geo. T., 4100 Ravenswood Ave., Chicago, Ill.

ENGRAVING, Radio Panel
Engraving to Order.
Eastern Specialty Co., 3551 N. Fifth, Philadelphia, Pa.
Etch-O-Gravure. See Insuline Corp. of America.
General Fabricating Co., 165 Greenwich, New York, N. Y.
Globe Mfg. Co., 101 Spokane St., Seattle, Wash.
Insuline Corp. of America, 76 Cortlandt, New York, N. Y
New England Products Co., 232 Greenwich, New York.
Preis & Co., Inc., H. P., 227 Fulton, New York, N. Y.
Schmidt, Inc., Geo. T., 4102 Ravenswood Ave., Chicago, Ill. (Tube Base Branders).
Schwenke Machine Engraving Co., 2036 Woodward Ave. Detroit, Mich.
Verichrome Laboratories, 4614 Spring Grove Ave., Cincinnati.
Wright Radio Co., 114 Exchange, Rockland, Mass.

EYELETS
Platt Bros. & Co., Waterbury, Conn.
Waterbury Button & Moulding Co., 835 S. Main, Waterbury, Conn.
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FABRIC, Radio Grill. See Cloth, Untreated.
FABRIC SHADES. See Shades, Fabric.
FAN BLADES. See Blades, Fan.

FEET, Felt
Brawley, T. R., 279 20th, Brooklyn, N. Y.

FELT
Advance Felt & Cutting Co., 609 W. Lake, Chicago.
American Felt Co., 211 Congress, Boston, Mass.
Booth Felt Co., 460 18th, Brooklyn, N. Y.
Brawley, T. R., 279 20th, Brooklyn, N. Y.
Western Felt Wks., 4029 Ogden Ave., Chicago, Ill.

FERRULES
Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh.
Chase Brass & Copper Co., Waterbury, Conn.
Clark Metal Products, 490 Hancock Ave., Bridgeport, Conn.
Grammes & Sons, Inc., L. F., Allentown, Pa.
Massachusetts Machine Shop, Inc., Boston, Mass.
Patton-MacGuyer Co., Providence, R. I.
Platt Bros. & Co., Waterbury, Conn.
Risdon Mfg. Co., Naugatuck, Conn.
Scovill Mfg. Co., 99 Mill, Waterbury, Conn.
Waterbury Brass Goods Corp., Waterbury, Conn.
Waterbury Button & Moulding Co., Waterbury, Conn.

FIBRE BOARD PRODUCTS (Solid and Corrugated)
Container Corp. of America, 111 W. Washington, Dept. 36, Chicago, Ill.
Mid-West Box Co., 111 W. Washington, Chicago.
Sefton Mfg. Corp., 59 E. Madison, Chicago, Ill.

FIBER CANDLES. See Candles, Fixture.
FIBRE GEARS. See Gears and Pinions, Composition.
Paper. See Cloth and Paper.
Radio Panels. See Radio Molded Parts.
Shipping Containers. See Fibre Board Products.
Vulcanized. See Fibre, Vulcanized.

FIBRE, Phenol
Moisture Proof; Sheet, Rod, Tubes.
Aico. See American Insulator Corp.
Amerine. See American Insulator Corp.
Armite. See Spaulding Fibre Co.
Bakelite-Dilecto. See Continental Fibre Co.
Continental-Diamond Fibre Co., Bridgeport, Pa.
Fibroc Insulation Co., 430 Lincoln Ave., Valparaiso, Ind.
Formica Insulation Co., 4638 Spring Grove Ave., Cincinnati, O.
Franklin Fibre Specialty Co., Wilmington, Del.
Micarta. See Westinghouse Elec. & Mfg. Co.
National Vulcanized Fibre Co., Wilmington, Del.
Phenolite See National Vulcanized Fibre Co.
Spaulding Fibre Co., Tonawanda, N. Y.
Synthane Corp., Oaks, Pa.
Vul-Cot. See National Vulcanized Fibre Co.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

FIBRE, Vulcanized
Sheet, Rod, Tube, Horn, Fibre, Bushings, Washers, Cleats, Screw Machine Products.
Brandywine Fibre Products Co., 1402 Walnut St., Wilmington, Del.
Conite. See Continental-Diamond Fibre Co.
Continental-Diamond Fibre Co., Bridgeport, Pa.
Delaware Hard Fibre Co., Box 970M, Wilmington, Del.
Egyptian. See Delaware Hard Fibre Co.
Electrosote. See Pantasote Co.
Fibro Products Co., New Bedford, Mass.
Franklin Fibre Specialty Co., Wilmington, Del.
Fyberoid. See Wilmington Fibre Specialty Co.
Independent Laboratories, 50 E. 42nd, New York, N. Y.
Iten Fibre Co., 5403 Bower Ave., Cleveland, O.
Leatheroid. See Rogers Fibre Co.
Lincoln Fibre & Specialty Co., Newport, Del.
National Vulcanized Fibre Co., Wilmington, Del.
Ohmoid. See Wilmington Fibre Specialty Co.
Pantasote Co., Inc., 250 Park Ave., New York, N. Y.
Peerless. See National Vulcanized Fibre Co.
Rogers Fibre Co., 210 Lincoln, Boston, Mass.
Spaulding Fibre Co., Tonawanda, N. Y.
Standard Fibre Products Co., 36 Pleasant, Watertown, Mass
Vul-Cot. See National Vulcanized Fibre Co.
Vulcawood. See Continental-Diamond Fibre Co.
Wilmington Fibre Specialty Co., Wilmington, Del.

FIBRE WASHERS. See Fibre.
FIELD COILS. See Coils, Finished.

FILAMENTS, Incandescent Lamp
Cohn, Sigmund, 44 Gold, New York, N. Y.
Conneway Elec. Laboratories, 406 Jefferson St., Hoboken.
Filament Supply Co., 1317 Willow Ave., Hoboken, N. J.
Gilby Wire Co., Riverside Ave., Newark, N. J.
National-Harris Wire Co., 195 Verona Ave., Newark, N. J.
Radio Products Corp., Steneck Trust Bldg., Hoboken, N. J
Suter & Nuetzl, 3709½ Lisbon Ave., Milwaukee, Wis.
Volkmar & Sons, 187 Sylvan Ave., Newark, N. J. (Lead-in-Welds.)

FILES, Commutator Slotting
Ideal Commutator Dresser Co., 1039 Park, Sycamore, Ill.
Martindale Electric Co., 1262 W. Fourth, Cleveland, O.

FISH PAPER. See Cloth and Paper.
FITTINGS, Fixture. See Fixture Fittings.
FIXTURE CANDLES. See Candles, Fixture.
FIXTURE CHAIN. See Chain, Fixture.
FIXTURE, Collars. See Fixture Fittings.

FIXTURE FITTINGS

	KEY
Bowl Holders	See B
Brass Fittings	See B
Canopies	See B
Collars	See B
Crow Feet	See I
Finials (Brass, Glass and Porcelain)	See R
Hangers	See H
Hickies, Brass	See B
Hickies, Iron	See I
Hooks, Brass	See B
Hooks, Iron	See I
Iron Fittings	See I
Loops, Brass	See B
Loops, Iron	See I
Rings	See B
Shade Holders	See S
Shells	See B
Spinnings	See B
Stampings	See B
Stems	See B
Straps	See H
Studs	See I

Acme Lighting Products, Inc., 2114 Woodland Ave., Cleveland, O. Straps ..... H
American Chain Co., Bridgeport, Conn. (Loops and Rings.) ..... B
American Ring Co., Waterbury, Conn. (Candle.) ..... S
Appleton Electric Co., 1703 Wellington Ave., Chicago, Ill. ..... B I
Arco. See American Ring Co.
Arrow Electric Division of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. ..... S
Artoloid. See Great Eastern Brass Wks., Inc.
Art Metal Co., 3721 Dayton, Cleveland, O. ..... H
Banlite. See East Side Metal Spinning Co.
Banner. See Plume & Atwood Mfg. Co.
Barton Brass Wks., 3627 Superior, Detroit. ..... B
Belmet. See B. & L. Metal Stamping Co.
Bloch Bros., 88 Walker, New York ..... B
Brandt Mfg. Co., 3727 Gratiot Ave., Detroit. B
Braun, J. G., 609 S. Pauline, Chicago, Ill. (Pressed Ornaments.) ..... B I
B. & L. Metal Stamping Co., 250 Moore, Brooklyn, N. Y. (Also Combination Wall Bracket Hanger.) ..... B I H
Cambridge Brass Co., Cambridge, Mass. ..... B
Chase Brass & Copper Co., Waterbury, Conn. B S
Chatham Metal Spinning & Stamping Corp., 128 Mott, New York, N. Y. ..... B I
Cleanezy. See Dunlap Co.
Colonial Stamping Co., Brill St. & Passaic Ave., Newark, N. J. ..... B S
Crescent Brass Mfg. Co., Reading, Pa. ..... B
Crouse-Hinds, Solvay Sta., Syracuse, N. Y. ..... S H
Diamond Needle & Mfg. Co., Torrington, Conn. (Hickies.) I
Dunlap Co., John, Carnegie, Pa. ..... S
East Side Metal Spinning Co., 451 Greenwich, New York, N. Y. ..... B
Eureka Tin Ware Mfg. Co., 135 W. 20th, New York, N. Y. ..... S
E-Z Up. See Plume & Atwood Mfg. Co.
Farlee Mfg. Co., Decatur, Ill. ..... B I S H
Flaherty Co., M. E., 28 S. Clinton, Chicago. I
Fralick Co., S. R., 15 S. Clinton, Chicago. I
Franklin Brass Foundry Co., Reading, Pa. B
Friedley-Voshardt Co., Chicago. ..... B
Grabler Mfg. Co., 6565 Broadway, S. E., Cleveland, O. I
Great Eastern Brass Wks., Inc., 132 Grand, New York, N. Y. (Spindles).
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. ..... S
Incandescent Supply Co., 468 West Broadway, New York, N. Y. ..... B H
Isco. See Incandescent Supply Co.
Jiffy. See White Mfg. Co., J. H.
Kwikon. See Fralick Co., S. R.
Lakin. See Thomas & Betts Co.
Liberty Brass Turning Co., 88 Walker, New York, N. Y. I
Liberty Iron Pipe & Nipple Works, 62 Greene, New York, N. Y. ..... B I
Liberty Machine Co., Wauwatosa, Wis. ..... B I
Light Metal Stamping Co., 310 13th St., West New York, N. J. ..... S
L & K Mfg. Co., 440 Adelphi, Brooklyn, N. Y. ..... H
L. & W. Brass Wks., 361 W. Superior, Chicago. B
Madelite. See Belson Mfg. Co.
M. S. W. Mfg. Co., 1527 Niagara Ave., Buffalo, N. Y. I
Metal Products Co., 210 Canal, New York. ..... B
Metro Iron Ornament Co., 191 Christie, New York, N. Y. I
Metropolitan-Columbia Mfg. Co., 714 Metropolitan Ave., Brooklyn, N. Y. ..... B
Midwest Elec. Co., 1639 Walnut, Chicago, Ill. I
Mid-West Chandelier Co., 14th & Chestnut Sts., Kansas City, Mo. ..... B
Mitchell-Vance Co., 70 Washington, Brooklyn, N. Y. ..... S
Monarch. See Perfecilite Co.
Murlin Mfg. Co., Philadelphia, Pa. ..... B I
National Electric Products Corp., Pittsburgh, Pa. (Studs.) I
New Era Elec. Mfg. Co., 6725 Machinery Ave., N. E., Cleveland, O. ..... H
New Wrinkle. See Bryant Elec. Co.
New York Brass Turning Co., 568 Broadway, New York, N. Y. ..... B
Nobolt. See Fralick & Co., S. R.
N. W. Cleat Receptacle Bracket, 2437 N. 29th, Philadelphia, Pa. I
Onli. See Perfecilite Co.
Pass & Seymour, Solvay Sta., Syracuse, N. Y. B S
Perfecilite Co., 1457 E. 40th, Cleveland. ..... S
Pittsburgh Valve & Fittings Co., Barberton, O. I
Plume & Atwood Mfg. Co., Waterbury, Conn. B S H
Plumwood. See Plume & Atwood Mfg. Co.
Plymouth. See Vester Sons, Alfred.
Products Machine Co., Bridgeport, Conn. ..... B
Reading Brass Co., 141 Schiller, Reading, Pa. B I
Ribaysen Mfg. Co., J., 952 W. Lake, Chicago, Ill. B
Rodale Mfg. Co., 200 Hudson, New York. ..... B H
Sandow Tool Co., 1440 Bway, New York, N. Y. ..... S
Scovill Mfg. Co., Waterbury, Conn. ..... B I
Simpalite. See Sprecher Mfg. Co., P. W.
Simplex. See Plume & Atwood Mfg. Co.
Springfast. See Plume & Atwood Mfg. Co.
Square-G. See Grabler Mfg. Co.
Standard Snap-Lite Corp., 504 Jackson Ave., Long Island City, N. Y. ..... S
Standard Metal Spinning Co., 128 Mott, New York, N. Y. ..... B
Star. See Perfecilite Co.
Star. See Steel City Elec. Co.
Steel City Elec. Co., Pittsburgh, Pa. I
Steele & Johnson Mfg. Co., Waterbury, Conn. B S
Stembridge & Brandt, 29 S. Clinton, Chicago, Ill. (White Metal.) ..... B
Sterling Spinning & Stamping Wks., 476 Broome, New York, N. Y.
T. & B. See Thomas & Betts Co.
Thomas & Betts Co., 63 Vesey, New York. I
Une. See Bryant Elec. Co., also Crouse-Hinds, also General Elec. Co., also Hart & Hegeman Mfg. Co., also Pass & Seymour.
United. See L & K Mfg. Co.
United Metal Spinning Co., 440 Adelphi, Brooklyn, N. Y. ..... B
Vester, Sons, Alfred, 5 Mason, Providence, R. I. B

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Victor. See Plume & Atwood Mfg. Co.
Virden, Div. of Gill-Virden Co., 6108 Longfellow Ave., Cleveland, O. ..... B
Walden Tool & Metal Mfg. Co., New Haven Conn. .....
Wameco. See Waterbury Metal Wares Co.
Waterbury Metal Wares Co., Waterbury, Conn. ..... S
Weber Brass Co., Whitney Power Block, Cleveland, O. ..... B
White Diamond. See White Mfg. Co., J. H.
White Mfg. Co., J. H., 79 Madison Ave., New York, N. Y. ..... B S
Wilhite Machine Wks., 1245 S. Hope, Los Angeles, Cal. ..... B

FLASHERS, Sign
Motor Flashers, Thermal Flashers, Flashing Sockets and Plugs.
Ajax. See Reynolds Spring Co.
A. & W. See General Outdoor Adv. Co.
Angelus. See Electric Sign Flasher Corp.
Betts, Inc., James H., 1393 Sedgwick Ave., New York. (Motor Flashers, Thermal Flashers, Flashing Sockets and Plugs.)
Betts & Betts Corp., 645 W. 43rd, New York, N. Y. (Motor Flashers.) (Thermal Flashers.) Flashing Plugs.)
California Sign Flasher Co., 280 Guttenberg, San Francisco.
Commercial Elec. Co., 1203 E. Grant, Portland, Ore.
Cramblet Engineering Div. of Time-O-Stat Controls Co., 250 Milwaukee, Milwaukee, Wis.
Diamond. See General Appliance Corp.
Dominic. See Kala-Flasher Co.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn, N. Y.
Electric Signal Corp., 406 Fourth Ave., Seattle, Wash.
Electric Sign Flasher Corp., 1826 W. 9th, Los Angeles, Cal.
Figuregram. See Reynolds Electric Co.
Flash O-Lite. See Betts, Inc., James H.
Flip-Flop. See Betts, Inc., James H.
Gem Engineering Co., Hempstead, N. Y.
Gazer. See General Appliance Corp.
General Appliance Corp., 120 8th, San Francisco, Cal. (Flasher Button.)
General Controler Co., 200 E. First, Dayton, O.
Grazier Elec'l Products Co., Johnstown, Pa.
Harrington-Seaberg Corp., 1708 Third Ave., Moline, Ill.
Horni Signal Mfg. Co., 516 Greenwich, New York, N. Y.
Jimbetts. See Betts, Inc., James H.
Kala-Flasher Co., 344 N. Church, Kalamazoo, Mich.
Killark. See Betts & Betts Corp.
Kontroler. See General Controler Co.
Mercury. See Betts, Inc., James H.
Opalume Sign System, Battle Creek, Mich.
Phelps Elec. Co., 29 S. Clinton, Chicago, Ill. (Motorless)
Phoenix Products Co., Phoenix, N. Y.
Presto Products Co., 64 University Place, New York, N. Y. (Sockets and Plugs.)
Reco. See Reynolds Elec. Co.
Reynolds Elec. Co., 2650 W. Congress, Chicago, Ill.
Reynolds Spring Co., Jackson, Mich.
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Ryan. See Phoenix Products Co.
Shedoodle. See Phelps Elec. Co.
Sokit. See Betts, Inc., James H.
Thermo-Wynk. See Betts & Betts Corp.
Vacu. See Betts & Betts Corp.
Veebar. See Betts, Inc., James H.
Way, Eugene W., Seattle, Wash.
Wood Electric Co., C. D., 565 Broadway, New York N. Y.
Woodwin. See Wood Elec. Co., C. D.
Wynk-A-Lyte. See Betts & Betts Corp.

FLASHLIGHT LENSES. See Lenses.
FLEXIBLE ARMS. See Tubing, Flexible Metallic.
FLEXIBLE LEADS, Commutator Brush. See Brushes, Commutator.

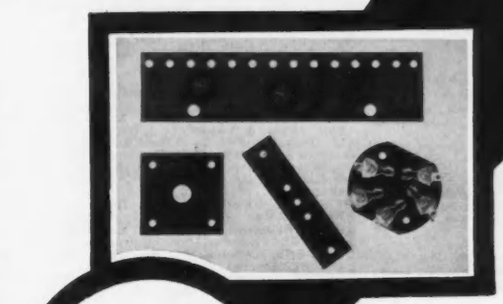
FLEXIBLE SHAFTING
Binghamton Flexible Shaft Co., 239 Water, Binghamton, N. Y.
Chicago Flexible Shaft Co., 5600 W. Roosevelt Rd., Chicago, Ill.
Haskins Co., R. G., 4636 W. Fulton, Chicago, Ill.
Stow Mfg. Co., 443 State, Binghamton, N. Y.
Strand & Co., N. A., 500 N. Lincoln, Chicago, Ill.

FOIL, Tin. See Tin Foil.

FORGINGS, Non-Ferrous
Scovill Mfg. Co., Waterbury, Conn.

FORMS, Coil Winding
Armature Coil Equipment Co., 2415 Forestdale Ave., Cleveland, O.
Comstock Mfg. Co., Wilkes-Barre, Pa.
Master. See Armature Coil Equipment Co.

FORMS, Wire
Forms and Frames for Shade Holders and Shades: Bending, Welding, Forming.
American Specialty Mfg. Co., 165 Holland Ave., Bridgeport, Conn.
Arrow Wire Frame Corp., 344 E. 23rd, New York, N. Y.
Blake & Johnson Co., 1497 Thomaston Ave., Waterville, Conn
Central Wire Frame Co., 154 E. 23rd, New York, N. Y. (Complete with socket, cord and plug.)
Chelsea Wire Wks., 675 Hudson, New York, N. Y.
Clark Metal Products Inc., 490 Hancock Ave., Bridgeport, Conn.
City Wire Frame Co., 2025 S. Michigan Ave., Chicago.
Electro Weld Co., 70 Munroe, Lynn, Mass.
Fischer Spring Co., Chas., 238 Kent Ave., Brooklyn, N. Y.
Grammes & Sons, Inc., L. F., Allentown, Pa.
Hubbard Spring Co., M. D., Pontiac, Mich.
Hunter Pressed Steel Co., Lansdale, Pa.
Jeschke Wire Specialty Wks., Crawfordsville, Ind.
Krischer's Mfg. Co., 255 Calyer, Brooklyn, N. Y.
Manhattan Wire Products Co., 398 First Ave., New York.
Murray Hill Wire Frame Co., 314 E. 32nd, New York, N. Y
Roebling's Sons Co., John A., Trenton, N. J.



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Watral & Sons, 133 E. 16th, New York, N. Y.
Young Industries, Inc., L. A., Detroit, Mich.

FRAMES, Wire. See Forms, Wire.

FRICTION TAPE. See Tape, Rubber and Friction.

FRINGE, Chandelier. See Crystals, Chandelier.

FUSE CLIPS

Sherman Mfg. Co., H. B., Battle Creek, Mich.
Waterbury Brass Goods Co., Waterbury, Conn.

FUSE PLUG SCREW SHELLS. See Shells, Screw Socket.

FUSE TESTERS. See Testers, Fuse and Circuit.

FUSES AND FUSE WIRE

KEY
Cartridge ..... See C
Plug ..... See P
Non-Refillable ..... See N
Refillable ..... See R
Open Link ..... See O
Fuse Wire ..... See O

Acme Elec. & Mfg. Co., Canal & Hamilton Ave., Trenton, N. J. ..... P
Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh, Pa. ..... O
Arkless. See Economy Fuse Mfg. Co.
Arrow Electric Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. ..... P N
Automatic Elec. Iron & Fuse Co., 215 S. American, Philadelphia, Pa. ..... P
Buss. See Bussman Mfg. Co.
Bussmann Mfg. Co., University & Jefferson Ave., St. Louis ..... C P N R O
Chase-Shawmut Co., Newburyport, Mass... C P N R O
Clearmite. See Economy Fuse & Mfg. Co.
Clear-Top. See Trico Fuse Mfg. Co.
Colortop. See Trico Fuse Mfg. Co.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn. (Automobile) ..... C . . N R . .
Commercial Enclosed Fuse Co., 1317 Willow Ave., Hoboken, N. J. ..... C P N . . .
Cote Bros. Mfg. Co., 182 W. Lake, Chicago C P . . R . .
Crystal. See Royal Elec. Co.
Daum Fuse & Elec. Mfg. Co., 1157 Hodgkins, Pittsburgh ..... C . . . R . .
D. & W. See Graybar Electric Co.
Economy Fuse & Mfg. Co., 2717 Greenview Ave., Chicago, Ill. ..... C P N R . .
Eco. See Economy Fuse & Mfg. Co.
Electric Fuseguard Co., Charlottesville, Va.. C P N R . .
Elliott Electric Co., Shreveport, La. ..... O
Gem. See Chicago-Jefferson Fuse & Electric
General Elec. Co., Merchandise Dept., Bridgeport, Conn. ..... C P N R . .
Graybar Electric Co., Graybar Bldg., Lexington Ave. and 43rd St., New York, N. Y. C . . . . . .
Great Western Fuse Co., 415 Lexington Ave., New York, N. Y. ..... C . . . R . .
H. & H. See Hart & Hegeman.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. ..... P . . R . .
Hudson Wire Co., Ossining, N. Y. ..... O
Kantark. See Trico Fuse Mfg. Co.
Kirkman Engrg. Co., 1 Dominick St., New York, N. Y. ..... C P N . . O
Littelfuse Laboratories, 1772 Wilson Ave., Chicago, Ill. (Low Capacity, Glass Enclosed, .025 to 2 Amp.) ....
Monarch Fuse Co., 116 E. First, Jamestown, N. Y. ..... C . . N R . .
National. See Economy Fuse & Mfg. Co.
Noark. See Colt's Patent Fire Arms Mfg. Co.
Pierce Renewable Fuses, Inc., 752 Main, Buffalo, N. Y ..... C P . . R . .
Platt Bros. & Co., Waterbury, Conn. ..... O
Powell, F. W., 119 W. Ohio, Pittsburgh.. . . P . . R . .
Ree-Nu-It Elec. Co., New Bedford, Mass.. C P . . R . .
Rochester Re-Fill Fuse Co., 402 Cottage, Rochester, N. Y. ..... C . . . R . .
Royal Elec. Co., Chelsea Station, Boston... . P N . . . .
Shawmut. See Chase-Shawmut Co.
Simplicity. See Cote Bros. Mfg. Co.
Six-in-One. See Industrial Engrg. Co.
Star Fuse Co., 235 Canal, New York, N. Y. C P . . R . .
Trico Fuse Mfg. Co., 1001 McKinley Ave., Milwaukee ..... C P N R . .
Union. See Chicago-Jefferson Fuse & Electric

GALVANIZING

Cattle & Bros., Joseph P., Gaul and Letterly Sts., Philadelphia, Pa.

GALVANOMETERS. See Instruments, Laboratory Standard.

GAS, Inert

Helium Co., Louisville, Ky.
Palstine Industrial Co., 111 Fifth Ave., New York, N. Y.
Weber, Alfred, 5 Union Square, New York, N. Y.

GAS SIGN ELECTRODES. See Electrodes for Gas Signs

GASKETS, Rubber

Gutta Percha & Rubber Mfg. Co., 15 Park Row, New York.
Canfield Rubber Co., Bridgeport, Conn.

GAUZE BRUSHES, Wire. See Brushes, Commutator.

GEARS, Fibre. See Gears and Pinions, Composition.

GEARS (Speed Changing Units)

Cleveland Worm & Gear Co., Cleveland, Ohio.
Cullman Wheel Co., 1346 Altgild, Chicago, Ill.
De Laval Steam Turbine Co., Trenton, N. J.
Falk Corp., Milwaukee, Wis.
Farrell-Birmingham Co., 344 Vielcan, Buffalo, N. Y.
Foote Bros. Gear & Machine Co., 215 N. Curtis, Chicago, Ill
Gears & Forgings, Inc., Cleveland, Ohio.
Grant Gear Works, Boston, Mass.
James Mfg. Co., D. O., Chicago, Ill.
Janette Mfg. Co., 556 W. Monroe, Chicago, Ill.
Jones Fdy. & Machine Co., W. A., Chicago, Ill.
Lipe, W. C., Syracuse, N. Y.
Nuttall Wks., of Westinghouse Elec. & Mfg. Co., McCandless Ave. & Harrison St., Pittsburgh, Pa.
Palmer-Bee Co., Detroit, Mich.
Ohio Gear Co., 1333 E. 179th, Cleveland, Ohio.
Perkins Machine & Gear Co., 125 Circuit Ave., Springfield, Mass.
Philadelphia Gear Works, Richmond and Tioga Sts., Philadelphia, Pa.
Smith Winfield H., Springville, N. Y.

GEARS, Worm

Albaugh-Dover Mfg. Co., Chicago, Ill.
Cleveland Worm & Gear Co., Cleveland, Ohio.
Colburn Gear & Mfg. Co. (Norfolk Downs), Quincy, Mass
Ohio Gear Co., 1333 E. 179th, Cleveland, Ohio.
Philadelphia Gear Works, Richmond and Tioga Sts., Philadelphia, Pa.

GEARS AND PINIONS, Composition

Continental-Diamond Fibre Co., Bridgeport, Pa.
Delaware Hard Fibre Co., Box 570M Wilmington, Del.
Fabroil. See General Elec. Co.
Foote Bros. Gear & Machine Co., 215 N. Curtis, Chicago.
Franklin Fibre Specialty Co., Wilmington, Del.
General Electric Co., Schenectady, N. Y.
Medart Co., St. Louis, Mo.

Micarta. See Westinghouse Elec. & Mfg. Co.
National Vulcanized Fibre Co., Wilmington, Del.
Ohio Gear Co., 1333 E. 179th St., Cleveland, Ohio.
Perkins Machine & Gear Co., 125 Circuit Ave., Springfield, Mass.
Stahl Gear Co., 1390 E. 40th, Cleveland, Ohio.
Stranahan Gear Co., Philadelphia, Pa.
Textoil. See General Electric Co.
Textolite. See General Electric Co.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

GEARS AND PINIONS, Iron and Steel

Chicago Stock Gear Wks., 763 W. Jackson Blvd., Chicago
Earle Gear & Machine Co., Wayne Junction, Philadelphia.
Falk Corp., Milwaukee, Wis.
Gears & Forgings, Inc., Cleveland, Ohio.
Grant Gear Works, Boston, Mass.
James Mfg. Co., D. O., Chicago, Ill.
Medart Co., St. Louis, Mo.
Meisel Bros. Mfg. Co., 944 Dorchester Ave., Boston, Mass.
Ohio Gear Co., 1333 E. 179th St., Cleveland, Ohio.
Perkins Machine & Gear Co., 120 Circuit Ave., Springfield, Mass.
Permag. See Perkins Machine.
Tool Steel Gear & Pinion Co., Cincinnati, Ohio.

GEARS AND PINIONS, Rawhide

Chicago Rawhide Mfg. Co., 1313 Elston Ave., Chicago, Ill
Gerdes & Co., 50 Church, New York, N. Y.
Syracuse Rawhide Mfg. Co., Syracuse, N. Y.
Western Rawhide & Belting Co., Milwaukee, Wis.

GENERATORS, Electroplating. See Plating Generators.

GLASS BULBS. See Bulbs, Glass.

GLASS CANDLES. See Candles, Fixture.

GLASS LETTERS. See Letters, Sign.

GLASS for Electrical Purposes

Corning Glass Wks., Corning, N. Y.
Pyrex. See Corning Glass Wks.

GLASSWARE

Alba. See Macbeth-Evans Glass Co.
Amazon. See Gleason-Tiebout Glass Co.
Amelites. See Consolidated Lamp & Glass Co.
Apollo. See Gillinder Bros., Inc.
Ardmore. See Jeannette Shade & Novelty Co.
Aurene. See Corning Glass Co.
Aurora. See Consolidated Lamp & Glass Co.
Bayley Sons, 105 Vanderveer, Brooklyn, N. Y.
Beaumont Co., Morgantown, W. Va.
Bellova. See McFaddin & Co., H. G.
Blanco. See Gleason-Tiebout Glass Co.
Berylite. See Plaut & Co., L.
Bostock, Rhoden & Co., 11 N. Moore, New York, N. Y
Camia. See Gleason-Tiebout Glass Co.
Carara. See Gleason-Tiebout Glass Co.
Celestialite. See Gleason-Tiebout Glass Co.
Chesler & Sons Co., J., 45 Varick Ave., Brooklyn, N. Y
Clearcut. See Ivanhoe Division of Miller Co.
Colcite. See Corning Glass Co.
Consolidated Lamp & Glass Co., Coraopolis, Pa.
Cora. See Consolidated Lamp & Glass Co.
Cora-Lites. See Consolidated Lamp & Glass Co
Corning Glass Co., Corning, N. Y.
Cremax. See Macbeth-Evans Glass Co.
Crystal. See Phoenix Glass Co.
Daylite. See Wells Glass Co.
Delica-White. See Kopp Glass, Inc.
Druid. See Ivanhoe Division of Miller Co.
Eagle Mfg. Co., Wellsburg, W. Va.
Emeralite. See McFaddin, H. G.
Equalite. See Bayley & Sons.
Erskine Glass & Mfg. Co., Wellsburg, W. Va.
Florentine. See Gleason-Tiebout Glass Co.
Genco. See Ivanhoe Division of Miller Co.
Gillinder Bros., Inc., Port Jervis, N. Y.
Gillinder & Sons, Inc., Philadelphia, Pa.
Gleason-Tiebout Glass Co., 99 Commercial, Brooklyn, N. Y
Gletleco. See Gleason-Tiebout Glass Co.
Havana. See Kopp Glass, Inc.
Hocking Glass Co., Lancaster, O.
Holophane Co., 342 Madison Ave., New York, N. Y.
Imperial Glass Co., Bellaire, O.
Inland Glass Works, Chicago, Ill.
Ivanhoe Division of Miller Co., Cleveland, Ohio.
Ivory. See Phoenix Glass Co.
Ivrex. See Ivanhoe Division of Miller Co.
Jeannette Shade & Novelty Co., Jeannette, Pa.
Jefferson Glass Co., Follansbee, W. Va.
Kopp Glass, Inc., Swissvale, Pa.
Lumina. See Hocking Glass Co.
Luminite. See Macbeth-Evans Glass Co.
Macbeth-Evans Glass Co., Dept. G, Eastern Division, Charleroi, Pa.
Magnolia. See Phoenix Glass Co.
McFaddin & Co., H. G., 38 Warren, New York, N. Y.
Mellilite. See Gillinder & Sons, Inc.
Micro. See Gillinder & Sons, Inc.
Miller Co., Meriden, Conn.
Monax. See Macbeth-Evans Glass Co.
Moonstone. See Jefferson Glass Co.
N. B. G. See Gillinder & Sons, Inc.
N. U. Glass. See Gillinder & Sons, Inc.
Nebulite. See Gillinder & Sons, Inc.
Nemalite. See Gillinder & Sons, Inc.
Nitro-Glas. See Jefferson Glass Co.
Nuart. See Imperial Glass Co.
Nulite. See Consolidated Lamp & Glass Co.
Nutralux. See Kopp Glass, Inc.
Opalux. See Gleason-Tiebout Glass Co.
Orpola. See Inland Glass Co.
Oplex. See Perfection Glass Co.
Astelle. See Consolidated Lamp & Glass Co
Pearltone. See Inland Glass Co.
Perfection Glass Co., Star City, W. Va.
Persian See Gillinder & Sons, Inc.
Phoenix Glass Co., Monaca, Pa.
Pilabrasgo. See Kopp Glass, Inc.
Pittsburgh Cut Glass Co., Monaca, Pa.
Plaut & Co., L., 432 E. 23rd, New York, N. Y.
Poly-Case. See Gleason-Tiebout Glass Co.
Prestepal. See Gleason-Tiebout Glass Co.
Radiant. See Phoenix Glass Co.
Regent. See Ivanhoe Division of Miller Co.
Rezelle. See Ivanhoe Division of Miller Co.
Rosedora. See Consolidated Lamp & Glass Co.
Shade-O-Tone. See Consolidated Lamp & Glass Co
Snow-White. See Inland Glass Works
Solomon & Son, Inc., L., 199 Wooster, New York, N. Y
Star Glass Co., Star City, W. Va.
Sudan. See Ivanhoe Division of Miller Co.
Thebian. See Macbeth-Evans Glass Co.
Translux. See Kopp Glass, Inc.

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13 Park Row, New York, N. Y.

Trojan. See Ivanhoe Div. of Miller Co.
United Novelty Glass Mfg. Co., 121 Prince, New York, N. Y.
Utopia. See Kopp Glass, Inc.
Velaria. See Ivanhoe Division of Miller Co.
Vineland Flint Glass Wks., Vineland, N. J.
Wells Glass Co., Kokomo, Ind.
Williamsburg Flint Glass Co., 290 Broadway, New York
Yural. See Ivanhoe Division of Miller Co.
Zanesville Mould Co., Zanesville, O.

GONGS, Unmounted Shells

Bevin Bros. Mfg. Co., East Hampton, Conn.
Bridgeport Brass Co., 774 E. Main, Bridgeport, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
East Hampton Bell Co., East Hampton, Conn.
Gong Bell Mfg. Co., East Hampton, Conn.
Hill Brass Co., M. N., East Hampton, Conn.
Liberty Bell Mfg. Co., Minerva, O.
Reiter, G. C., Canton, O.

GRAPHITE BEARINGS. See Bearings, Oil-less.

GRID LEAKS. See Radio Circuit Components.

GRIDS, Resistance. See Units, Rods and Grids.

GRILL CLOTH. See Cloth, Untreated.

GRINDERS, Commutator. See Tools, Commutator Truing.

GROMMETS. See Eyelets.

GROUND LOCATORS. See Instruments, Portable and Switchboard: also Testers, Coil.

GROWLERS, Armature. See Testers, Coil.

HANDLES, Wood; For Switches or Sad Irons

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Bogert & Hopper, 225 Varick, New York, N. Y.
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Fitchburg Enamel Co., Fitchburg, Mass.
Flanders Hardware Co., North Weare, N. H.
Fuller, J. J. Westfield, Mass.
Narragansett Mach. Co., Pawtucket, R. I.
National Wood Process, New Bedford, Mass.
Novelty Turning Co., Norway, Me.
Ober Mfg. Co., Chagrin Falls, O.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O
Piqua Handle & Mfg. Co., Piqua, Ohio.
Royal Enamel Co., Fitchburg, Mass.
Schutz Bros., 152 Chambers, New York, N. Y.
Stiles & Co., H. A., 174 Portland, Boston, Mass.
Stratton Mfg. Co., Stratton, Maine.
Strombeck-Becker Mfg. Co., Moline, Ill.
Sun Enamel Wks., Leominster, Mass.

HOLDERS, Brush. See Brushes, Commutator.

HOT WIRE METERS. See Instruments, Portable and Switchboard.

IMPREGNATING COMPOUNDS. See Wax and Compounds

IMPREGNATING, VACUUM. See Ovens, Industrial.

INCANDESCENT LAMP BULBS (Unfinished). See Bulbs, Glass.

INCANDESCENT LAMP FILAMENTS. See Filaments, Incandescent Lamp.

INDICATORS, Operation

Operation and Cost Indicators for Manager's Office.
Bristol Co., Waterbury, Conn. (Elapsed Time Recorder.)
Production Meter Co., 1315 S. Wabash Ave., Chicago, Ill

INDUCTION COILS. See Coils, Finished.

INSTRUMENT, Jewels. See Jewels.

INSTRUMENTS, Laboratory Standard. See Instruments, Laboratory Standard.

INSTRUMENTS, Portable Testing. See Instruments, Portable and Switchboard: also Instruments, Pocket.

INSTRUMENTS, Laboratory Standard

Beck Bros., 3640 N. Second, Philadelphia, Pa.
Biddle, James G., 1211 Arch, Philadelphia, Pa.
Burt, R. C., 327 Michigan Ave., Pasadena, Cal. (Oscilloscopes.)
Cambridge Instrument Co., Grand Central Terminal Bldg., New York, N. Y.
Chicago Apparatus Co., 1735 N. Ashland Ave., Chicago, Ill
Delta-Star Elec. Co., 2437 Fulton, Chicago, Ill.
Eppley Laboratory, Newport, R. I. (Standard Cells.)
Fahy. See Rubicon Co.
General Electric Co., Schenectady, N. Y.
Gray Instrument Co., 64½ W. Johnson, Philadelphia, Pa
Hickok Elec'l Instrument Co., 10514 Dupont, Cleveland, O
Jagabi. See Biddle, James G.
Jewell Elec. Instrument Co., 1650 Walnut, Chicago, Ill.
Kasson. See Rawson Elec'l. Instrument Co.
Kelvin. See Leeds & Northrup Co.
Kohlrausch. See Leeds & Northrup Co.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa
Milvay. See Chicago Apparatus Co.
Osiso. See Westinghouse Electric & Mfg. Co.
Radio Elec'l Wks., 50 W. 22nd, New York, N. Y.
Rawson Elec'l Instrument Co., Cambridge, Mass.
Roller-Smith Co., 239 Broadway, New York, N. Y
Rubicon Co., 29 N. Sixth, Philadelphia Pa. (Wheatstone Bridges, Galvanometers, Inductance Condensers, Potentiometers, Resistance Boxes, Permeameters.)
Simplex. See Leeds & Northrup Co.
Strobatchy. See Radio Elec'l Wks.
Stromberg Electric Co., 223 W. Erie, Chicago, Ill.
Thompson-Levering Co., 351 N. 57th St., Philadelphia, Pa
Unipivot. See Rawson Elec'l Inst. Co.
Vreeland Apparatus Co., 140 Cedar, New York, N. Y (Sine Wave Oscillators.)
Westinghouse Electric & Mfg. Co., Newark, N. J.
Weston Elecl. Instrument Corp., 582 Frelinghuysen Ave., Newark, N. J.

INSTRUMENTS, Pocket

Advance. See Eldredge Elec'l Corp.
Adbro Mfg. Co., 927 French, Pittsburgh, Pa.
Eclipse. See Eldredge Elec'l Corp.
Eldredge Elec'l Corp., 3 P. O. Sq., Springfield, Mass
Ideal Instrument Co., Penacook, N. H.
Jewell Elec. Instrument Co., 1650 Walnut, Chicago, Ill.
Kellogg Switchboard & Supply Co., 1066 W. Adams, Chicago, Ill.
Lundquist Tool & Mfg. Co., Worcester, Mass.
Milavolt. See Adbro Mfg. Co.
Readrite Meter Works, 7 College Ave., Bluffton, Ohio.
Roller-Smith Co., 239 Broadway, New York, N. Y.
Shire Elec. Products Co., Marquette Bldg., Detroit, Mich
Sholder-Excel Mfg. Co., Clyde, Ohio.
Square D Company, Detroit, Mich.
Sterling Mfg. Co., 2831 Prospect Ave., Cleveland, Ohio.
Weston Elecl. Instrument Corp., 583 Frelinghuysen Ave., Newark, N. J.
Wigginton. See Square D Company.
Yankee. See Lundquist Tool Mfg. Co.

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This heading includes all standard, portable and switchboard types, measuring and testing instruments—ammeters, voltmeters, wattmeters, ohmmeters, cable testers and fault-finders.

See Also Instruments, Pocket; Also Instruments, Laboratory Standard.

Beck Bros., 421 Sedgley Ave., Philadelphia, Pa.
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Biddle, James G., 1211 Arch, Philadelphia, Pa.
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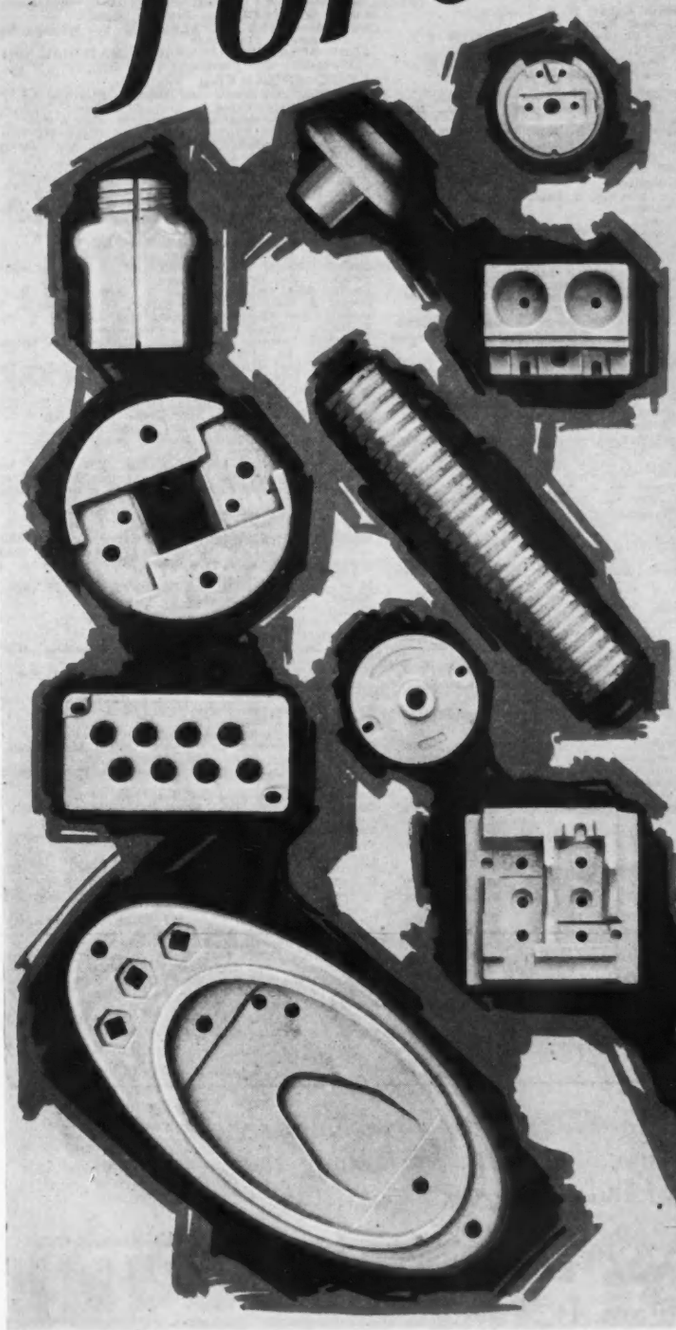

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Ground-Ohmer. See Stlcht & Co.
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Handy. See Weinberg & Co.
Hicbok Elecl. Inst. Co., 10514 Dupont, Cleveland, O.
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Leeds & Northrup Co., 4901 Stanton Ave., Philadelphia, Pa.
Master. See Jewell Elecl. Instrument Co.
M. D. C. See Metropolitan Devices Corp.
Megger Testing Sets. See Biddle.
Metropolitan Devices Corp., 1250 Atlantic Ave., Brooklyn.
Multi-Volt Trouble Finder. See Weiford, Jr., Geo. W.
Nagel Elecl. Co., W. G., 23 St. Clair, Toledo, Ohio.
Norton Elecl. Inst. Co., 81 Hilliard, Manchester, Conn.
Paneltest Meters. See Beede Instrument Co.
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Pier Equipment Mfg. Co., Benton Harbor, Mich.
Pin-Jack. See Weston Elec'l Instrument Co.
Price Hollister Co., Rockford, Ill.
Queen. See Gray Instrument Co.
Radio Electric Works, 150 West 22nd St., New York, N. Y.
Rawson Elecl. Inst. Co., Cambridge, Mass.
Roller-Smith Co., 120 Broadway, New York, N. Y
Shortfinder. See Eisemann Shortfinder Co.
Standco. See Sticht Co., H. H.
States Co., Hartford, Conn.
Sterling Mfg. Co., 2831 Prospect Ave., Cleveland, Ohio.
Sticht & Co., H. H., 13 Park Row, New York, N. Y.
Tanner Engrg. Co., Rawson St. and Nelson Ave., Long Island City, N. Y.
Test-A-Bat. See Beede Instrument Co.
Thompson-Levering Co., 351 N. 57th, Philadelphia, Pa.
Thomson. See General Electric Co.
Triplex Meters. See Roller-Smith Co.
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Two-in-One. See Stitcht Co., Herman H.
United States Gauge Co., 44 Beaver, New York, N. Y.
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Canopy. See Insulators, Canopy.
Cloth. See Cloth & Paper.
Composition. See Molded Insulation.
Compound. See Wax and Comp.
Fibre. See Fibre.
Lava. See Cores, Resistance Coil.
Marble. See Slate
Mica. See Mica.
Molded. See Molded Insulation.
Paint. See Paint, Varnish, Laquer.
Paper. See Cloth and Paper Insulating.
Phenolic. See Fibre, Phenol. Also Molded Insulation.
Porcelain. See Porcelain.
Rod. See Rubber, Hard.
Rubber. See Rubber, Hard.
Sealing Wax. See Wax and Compounds.
Slate. See Slate.
Soapstone. See Soapstone.
Tubing. See Tubing, Varnished Fabrics.
Varnish. See Paint and Varnish.
Wax. See Wax and Compounds.

INSULATING MACHINES, WIRE. See Wire Manufacturing Machines.
INSULATING TUBING. See Tubing, Varnished Fabric; also Tubing, Rubber.

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Artos Engrg. Co., 115 Brown, Milwaukee, Wis.

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INSULATION SHEARS. See Shears, Insulation.
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INSULATION TESTERS. See Instruments, Laboratory Standard.

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Franklin Fibre Specialty Co., Wilmington, Del.
General Electric Co., Schenectady, N. Y.
Knu. See Stanley, Arthur F.
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Stanley, Arthur F, 150 Varick, New York, N. Y.
Wilmington Fibre Specialty Co., Wilmington, Del.

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IRONS, Soldering. See Soldering Irons.
JACKS, Armature. See Lifts, Armature.
JACKS, Radio. See Radio Receiver Parts.

JARS, Battery, Glass
For Composition Jars. See Molded Insulation; also Rubber.
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Cumberland Glass Mfg. Co., Bridgeton, N. J.
Gaynor Glass Works, Salem, N. J.
Gillinder & Sons, Inc., Philadelphia, Pa.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Macbeth-Evans Glass Co., Dept. G, Eastern Division Charleroi, Pa.
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Deknatel & Sons, J. A., Queens Village, N. Y.
Eastern Specialty Co., 3551 N. Fifth, Philadelphia, Pa.
Fisher, Thomas E., Penacook N. H.
Gatti, Inc., Aurele M., Liberty St. & Fairmount Ave., Trenton, N. J.
Moser Jewel Co., Perth Amboy, N. J.
Mildrum Jewel Co., East Berlin, Conn.
Sapphire Products Co., 51 Chambers, New York, N. Y
Universal. See Oefinger, J. L.
Wennstrom's Sons Co., John, Suffern, N. Y.
Worley Jewel Co., John, Waltham, Mass.

JOINTS, Fixture Insulating
Appleton Elec. Co., 1703 Wellington Ave., Chicago, Ill.
Macallen Co., Boston 27, Mass.
Sandow Tool Co., 1440 Broadway, New York, N. Y.
Sprecher Mfg. Co., P. W., 3220 North Ave., Milwaukee.
White Co., O. C., 15 Hermon, Worcester, Mass.
Wittenberg Bros., 60 Shipman, Newark, N. J.

LABORATORY (Laboratories.)
Ovens. See Ovens, Industrial & Laboratory.
Rheostats. See Rheostats.
Testing. See Testing.

LABORATORY STANDARD INSTRUMENTS. See Instruments, Laboratory Standard.
LACQUER, ARMATURE. See Paint, Varnish and Lacquer.
Metal. See Paint, Varnish and Lacquer.
LAMINATIONS. See Discs, Armature.
LAMP BASES. See Bases, Reading Lamp.
LAMP BULBS (Unfinished). See Bulbs, Glass.
LAMP FILAMENTS. See Filaments, Incandescent Lamp.
LAMP LEAD-IN WELDS. See Filaments, Incandescent Lamp.

LAMP TESTING PHOTOMETERS. See Photometers, Lamp.

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Allen Electric & Equipment Co., Kalamazoo, Michigan
Cincinnati Lathe & Tool Co., 3207 Disney (Oakley) Cincinnati, Ohio.
Hobart Bros. Company, Troy, Ohio. (Test Bench).
South Bend Lathe Works, 425 E. Madison, South Bend, Ind.
Weidenhoff, Joseph, 4352 W. Roosevelt Rd., Chicago, Ill.

LAVA. See Cores, Resistance Coil.

LEAD
American Lead Co., 3112 Penn Ave., Pittsburgh, Pa.
Blatchford Co., E. W., 608 Dearborn, Chicago, Ill.
Columbia Smelting & Refining Wks., 365 West, New York, N. Y.
Eagle-Picher Lead Co., 134 N. LaSalle, Chicago, Ill.
Federated Metals Corp., Woolworth Bldg., New York, N. Y.
Jacobson & Son Co., I. M., 15304 Idaho, Detroit, Mich.
National Lead Co., 111 Broadway, New York, N. Y.
Raymond Lead Co., 735 S. Washtenam Ave., Chicago, Ill.
Turner Lead Co., East St. Louis, Ill.
United Metals Selling Co., 25 Broadway, New York, N. Y.

LEAD-IN WELDS, Lamp. See Filaments, Incandescent Lamp.

LEADS, FLEXIBLE (Commutator Brush). See Brushes.

LENSES
Sign Letter, Flashlight, Projector and Reflector Lenses. Also glass caps, jewels and bezels for all electrical devices See also Jewels, Instrument Bearing.
Bausch & Lomb Optical Co., 635 St. Paul, Rochester, N. Y. (Condensing and Projection Lenses.)
B. B. T Corp. of America, Atlantic Bldg., Philadelphia, Pa.
Corning Glass Wks, Corning, N. Y. (Flashlight and Signal.)
Deknatel & Sons J. A., Queens Village N. Y.
Electric Power Equipment Corp., 412 W. 18th, Philadelphia, Pa.
Elpeco. See Electric Power Equipment Corp.
Goerz American Optical Co., C. P., 317 E. 34th, New York.
Jefferson Glass Co., Follansbee, W. Va. (Sign and Flashlight.)
Kliegl Bros. Universal Stage Ltg. Co., 321 W. 50th, New York, N. Y. (Condensing and Projector.)
Macbeth Evans Glass Co., Dept G. Eastern Division, Charleroi Pa. (Flashlight.)
North Light Corp., 30 W. 15th, New York, N. Y.
Popper & Sons, Leo, 147 Franklin, New York, N. Y.
Pyle National Co. 1334 N. Kostner Ave., Chicago, Ill
Rochester Glass Products, Inc., 29 N. Water, Rochester, N. Y.
Rodefer Glass Co., Bellaire, O. (Flashlight.)

Sneath Glass Co., Hartford City, Ind. (Sign.)
Stromberg-Carlson Telephone Mfg. Co., 1050 University Ave., Rochester, N. Y.

LETTERS, Sign
Glass. Metal.
Adsign Corp, 113 W. 63rd, New York, N. Y.
Chain Products Co., 3924 Cooper Ave., Cleveland, O. (Brass and White Metal.)
Chicago Miniature Lamp Co., 654 W. Lake, Chicago, Ill. (Raised Letters for Signs.)
Eradium. See Pioneer Corporation.
Federal Elec. Co., 8700 S. State, Chicago, Ill. (Metal.)
Grammes & Sons, Inc., L. F., Allentown, Pa.
Heralite. See Pressed Prism Plate Glass Co.
Kolux Glass Sales Co., Kokomo, Ind.
Lu-Mi-Nus Signs, Inc., 2736 Wentworth Ave., Chicago, Ill.
Manhattan Elecl. Supply Co., 510 Sixth Ave., New York, N. Y. (For Gas Signs.)
Opalite Corp., 201 E. Ohio, Chicago, Ill.
Pioneer Corporation, 8308 Yale Ave., Chicago. (Luminous.)
Pressed Prism Plate Glass Co., Chicago, Ill. (Glass.)

LIFTS, Armature
Lifts, Hoists, Jacks, Trucks, Buggies, Floor Cranes.
Columbia Machine Works & Malleable Iron Co., Atlantic Ave. & Chestnut St., Brooklyn, N. Y.
Duff Mfg. Co., Pittsburgh, Pa.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Peerless. See Electric Service Supplies Co.
Ridion Company, Frank, Boston, Mass.

LININGS, Socket
Remington Mfg. Co., 937 Barnum Ave., Bridgeport, Conn.

LOCK WASHERS. See Washers, Lock.
LOOP WINDERS & SPREADERS. See Winding Machines, Armature & Field Coil.
LOUD SPEAKER DIAPHRAGMS MATERIAL. See Cloth, Untreated; also Parchment Paper.

LOUD SPEAKERS
Manufacturers Units and Electric Pick-ups for Portable and Built-in Types.
Amervox. See American Reproducer Co.
American Radio Products Corp., 149 Broadway, New York.
American Reproducers Co., 1204 Summit Ave., Jersey City, N. J.
A. R. C. See American Reproducers Co.
Amplion. See Woolf, J. W. & W. L.
Balsa Wood Co., 158 Pioneer, Brooklyn, N. Y.
Baritone Mfg. Co., 846 Jackson Blvd., Chicago, Ill.
Brooklyn Metal Stamping Corp., 740 Atlantic Ave., Brooklyn, N. Y. (Electric Pick-up.)
Cannonball. See Cannon & Miller Co.
Cannon & Miller Co., Springwater, N. Y.
Chelten Electric Co., 4859 Stenton Ave., Philadelphia, Pa.
Conamic. See Operadio Mfg. Co.
Decatur Mfg. Co., 45 Harman St., Brooklyn, N. Y.
Dreher & Son, Chas., 157 Spring, New York, N. Y.
Dymac. See Electrical Products Mfg. Co.
Electrical Products Mfg. Co., Providence, R. I.
Electrical Research Laboratories, 2300 Cottage Grove Ave., Chicago, Ill. (Units.)
Empire United Hat Block Co., 312 E. 12nd, New York.
Engineers Service Co., 25 Church, New York, N. Y. (Kit.)
Ensco. See Engineers Service Co.
Fenco Cone Co., 57 Murray, New York, N. Y. (Kit.)
Fidelity Radio Corp., Salt Lake City, Utah.
F. & H. Radio Laboratories, Fargo, N. D.
Globe Technolian Corp., Reading, Mass.
G. R. P. See Penn Mfg. Co.
Grutsl Speaker Co., 609 E. Walnut, Des Moines, Iowa.
Jensen Radio Mfg. Co., 6601 S. Lavanie Ave., Chicago, Ill.
Kersten Radio Equipment, Inc., 1415 Filliford, Kalamazoo, Mich.
Kyle. See Newcombe-Hawley.
Lata Balsa. See Balsa Wood Co.
Magnavox Co., 4250 Horton, Oakland, Cal. Also Units.
Mandel Electric Co., 2157 N. California Ave., Chicago, Ill.
Markone Radio Mfg. Co., 303 Devoe, Brooklyn, N. Y. (Horn.)
Miles Mfg. Corp., 31 W. 21st, New York, N. Y.
Minuet. See Thompson Radio Co.
Newton Elec'l Mfg. Co., Newton, Mass.
O'Neil Mfg. Corp., West New York, N. J.
Operadio Mfg. Co., St. Charles, Ill.
Oxford Radio Corp., 3200 Carroll Ave., Chicago, Ill.
Peerless. See United Reproducers Corp.
Philadelphia Storage Battery Co., Ontario & C Sts., Philadelphia, Pa.
Philco. See Philadelphia Storage Battery Co.
Platter Cabinet Co., North Vernon, Ind.
Powerola. See Temple Corp.
Puropower. See Platter Cabinet Co.
Quam Radio Products Co., Div. of United Air Cleaner Corp., 9705 Cottage Grove Ave., Chicago, Ill.
Racon Elec. Co., 18 Washington Place, New York, N. Y. (Horn only.)
Red Lion Cabinet Co., Red Lion, Pa.
Stromberg-Carlson Tel. Mfg. Co., 1060 University Ave., Rochester, N. Y.
Sweboda Co., Maritime Bldg., Seattle, Wash.
Temple Corp., 5253 W. 65th, Chicago, Ill.
Thompson Radio Co., 25 Church, New York, N. Y.
Ultratone Mfg. Co., 1046 W. Van Buren, Chicago, Ill.
United Reproducers Corp., 25 Leighton Ave., Rochester, N. Y.
Universal. High Power Telephone Co., Carleton Ave. and Eddy, Seattle, Wash.
Utah Radio Products Co., 1615 S. Michigan Ave., Chicago, Ill. (Also Piano Unit.)
Utona. See American Radio Products Corp.
Victor Radio Corp., 4321 N. Western Ave., Chicago, Ill.
Wondrphone. See Universal High-Power Telephone Co.
Woolf, J. W. & W. L., 133 W. 21st, New York, N. Y.
Wright-De Coster, Inc., St. Paul, Minn.

LUGS, Copper
Anderson Mfg. Co., Albert & J. M., 289 A St., Boston.
Dante Elecl. Mfg. Co., Bantam, Conn.

How a manufacturer of motor-driven tiering machines secures considerable leeway in motor selection by keeping the factor of simplicity in mind during the design stage

Simplified Motor Selection

by William B. Pavey

on page 24 of this issue

SOME RESULTS OF GOOD OVEN PRACTICE

(Japanning and Enameling)

The advantages of good baking equipment stand out sharply—easy to see and easy to measure. Following are a few typical cases:

> > 1 < <

This oven is operating in a plant producing automobiles in the higher price range, where inspection is necessarily very strict. Since this oven went into commission, rejections from all causes have been held to a maximum of 2%.

> > 2 < <

The 14 ovens previously used by this automobile manufacturer to enamel sheet metal parts, required an operating force of 37 men on a production schedule of 52 cars per day (10 hours). With the 2 new ovens, 19 men are turning out parts for 112 cars per day (10 hours).

> > 3 < <

Dental instruments and equipment are finished in these ovens. Before the present installation was made, the baking period was 3 hours. It is now 1½ hours from a cold start. The superintendent mentions running a lot of 50 motor cases, using 2 coats, and getting no rejects.

> > 4 < <

Before the installation of this electrical unit, every piece of product finished in this plant was given a 4½ hour bake. The new unit delivers a superior finish with a 1 hour bake.

> > 5 < <

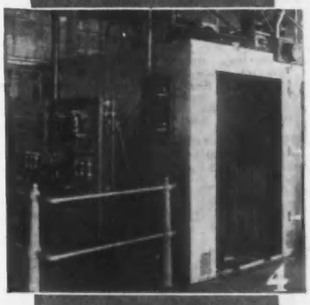
The savings in direct labor in the japanning department of this washing machine manufacturer, due to this type of oven, amounts to 25 men on a 600 machine capacity. The total savings will pay for this equipment in about 6 months.

Perhaps there is an opportunity to accomplish a similiar saving in your finishing department or to improve the grade of finish you are now using. A word from you will bring concrete suggestions.

1

2

3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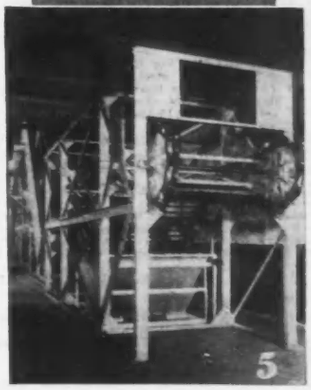
5

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432 Pennant Bldg.....St. Louis
273 Seventh Street.....San Francisco
908 Ellicott Square.....Buffalo
20 East Jackson Blvd.....Chicago
807 San Fernando Bldg.....Los Angeles
248 Central Bldg.....Seattle, Wash.
10 High Street.....Boston, Mass.
Hiram Walker & Sons Metal Products, Limited, Walkerville, Ont., Canada

OVENS FOR

Core and Mold baking.

Low temperature heat treating.

Drying.

Japanning and enameling.

Electrical appliance baking.

Adapted to all methods of heating.

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INDUSTRIAL OVENS

BAKELITE MOULDERS

SHAW

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We are Custom Moulders of

Bakelite *and* Durez Parts

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1025 Mill St., Lockport, N. Y.

MOULDED PORCELAIN

. . . the most satisfactory

MOULDED INSULATION

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Trenton, N. J.

LUGS, Copper—Continued
French Mfg. Co., Waterbury, Conn.
General Electric Co., Schenectady, N. Y.
Sherman Mfg. Co., H. B., Battle Creek, Mich.
Wolverine Tube Co., 1431 Central Ave., Detroit, Mich.

LUMINOUS SPECIALTIES

KEY
Luminous Compound .....See C
Pendants (Bulbs) .....See P
Standard Parts .....See S
Acornlite Studios, 675 72nd, Brooklyn, N. Y. ..... P
Arrow Electric Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. ..... S P
Bryant Electric Co., Bridgeport, Conn. ..... P
Connecticut Elec. Mfg. Co., Bridgeport, Conn. ..... S
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis.
Eagelite. See Eagle Elec. Mfg. Co.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn, N. Y. ..... P
General Elec. Co., Merchandise Dept., Bridgeport, Conn. ..... S P
Glow Lite. See Rodale Mfg. Co.
Glow Tip. See Arrow Electric Co.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Electric Co., Hartford, Conn. ..... S P
Hubbell, Inc., Harvey, Bridgeport, Conn. ..... P
Luma & Luma Lite. See Radium Dial Co.
Radieye. See General Electric Co.
Radium Dial Co., 8532 Forbes, Pittsburgh, Pa. .... C . . P
Reynolds Spring Co., Jackson, Mich. ..... S .
Rodale Mfg. Co., 200 Hudson, New York, N. Y. ..... P
Seelite. See T. C. Smith & Co.
Smith & Co., T. C., 3915 Powelton Ave., Philadelphia . . P
Spot O Life. See Hart & Hegeman Mfg. Co.
Undark. See United States Radium Corp.
United States Radium Corp., 535 Pearl, New York, N. Y. ..... C S P

MACHINE SCREWS. See Screws, Machine.
MACHINE SCREW PRODUCTS. See Screw Machine Products.

MACHINES
Armature Banding. See Banding Machines, Armature
Armature Notching. See Notching Machines, Armature
Balancing. See Balancers, Armature.
Banding. See Banding Machines, Armature.
Cable Armoring. See Wire Manufacturing Machines.
Coil Shaping. See Shaping Machines, Coil.
Coil Taping. See Taping Machines, Coil.
Coil Winding. See Winding Machines.
Commutator Slotting. See Mica Undercutters.
Engraving. See Engraving Machines.
Incandescent Lamp Making. See Machines, Lamp Making
Molded Insulation. See Presses, Molded Insulation.
Perforating. See Perforating Machines.
Porcelain Molding. See Presses, Porcelain Molding.
Radio Tube. See Machines, Lamp Making.
Shaping. See Shaping Machines, Coil.
Slotting. See Mica Undercutters.
Soldering. See Soldering Machines, Commutator.
Spring Making. See Spring Making Machines.
Taping. See Taping Machines, Coil.
Tension. See Tension Machines, Band Wire.
Winding. See Winding Machines.
Wire, Armoring. See Wire Manufacturing Machines.
Wire Drawing. See Wire Drawing Machinery.
Wire Insulator. See Wire Manufacturing Machines.
Wire Measuring. See Wire Manufacturing Machines.
Wire Tension. See Tension Machines, Band Wire.
Wire Wrapping. See Wire Wrapping Machines.

MACHINES, Lamp Making
For Making Incandescent Lamps and Vacuum Tubes.
Berrenberg, R., 12 Farnham (Roxbury), Boston, Mass (Vacuum Pumps.)
Cserwenka, Frank, 35 Monroe, Passaic, N. J. (Bombarding Machines.)
Dwyer Machine Co., Lynn, Mass.
Eisler Electric Corp., 770 S. 13th, Newark, N. J.
General Engineering & Supply Co., 160 5th Ave., New York, N. Y. (Filament Winder.)
Gesco. See General Engineering & Supply Co.
Radio Elect. Wks., 150 W. 22nd, New York, N. Y.
Rhason Mfg. Co., 124 45th, Union City, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
York Elec. & Machine Co., 30 Penn, York, Pa.

MACHINES, Bombarding. See Machines, Lamp Making.
MACHINES, Pleating and Fluting. See Pleating Machines.
MACHINES, Spring Making. See Spring Making Machines
MACHINES, WIRE MANUFACTURING. See Wire Manufacturing Machines.
MAGNET CHARGERS. See Chargers, Magnet.
MAGNET STEEL. See Steel, Magnet.
MAGNET TESTERS. See Instruments, Portable and Switchboard; also Instruments, Pocket.
MAGNET WIRE MACHINES. See Enameling Machines for Magnet Wire.
MAGNETIC CHUCKS. See Chucks, Magnetic.
MAGNETIC CLUTCHES. See Clutches, Magnetic.
MAGNETOMETERS. See Instruments, Pocket.

MAGNETS, Permanent
Bullens Co., D. K., Pottstown, Pa.
Ind. Steel Products Co., 4545 S. Western Blvd., Chicago
Rogers Drop Forging Co., Worcester, Mass.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Thomas & Skinner Steel Products Co., 1102 E. 23rd, Indianapolis, Ind.
Valley Appliances, Inc., 634 Lexington Ave., Rochester, N. Y.

MALLETS, Raw Hide
Chicago Rawhide Mfg. Co., 1313 Elston Ave., Chicago, Ill.
Crude Pelt. See Chicago Rawhide Mfg. Co.
Holbrook Raw Hide Mfg. Co., 748 N. Main, Providence, R. I.
MANGANESE, Battery. See Chemicals, Battery.
MARKERS AND STAMPERS, Metal
Schmidt, Inc., Geo. T., 4102 Ravenswood Ave., Chicago, Ill.
MEASURING INSTRUMENTS. See Instruments.

METAL CUTTING OUTFITS. See Welding and Cutting
MECHANICAL RUBBER GOODS. See Rubber Mechanical Goods.
MEGOHMMETERS. See Instruments, Laboratory Standard
MERCURY SWITCHES. See Switches, Mercury.
METAL CLEANERS (Compound). See Cleaners, Metal.
Outfits.
METAL FINISHING. See Plating & Finishing.
METAL MARKING OUTFITS. See Engraving Machines.
METALLIC SHADES. See Shades, Metallic.
METERS. See Instruments.
MICA SHADES. See Shades, Mica.
MICA TAPE. See Tape, Mica.
MICA UNDERCUTTERS. See Slotting Machines & Tools, Commutator.

MICA
Asheville Mica Co., Biltmore, N. C.
Asco. See Schoonmaker Insulation Co.
Brand & Co., William, 268 Fourth Ave., New York, N. Y.
Chicago Mica Co., 345 Campbell, Valparaiso, Ind.
Colonial Mica Co., 136 Seventh, Jersey City, N. J.
Fillion, S. O., 68 Murray, New York, N. Y.
Ford Radio & Mica Corp, 113 Bleecker, New York, N. Y.
Gerdau Co., Otto, 533 Canal, New York, N. Y.
Hirsch Mica Co 1087 Flushing Ave., Brooklyn, N. Y.
Hoyt, Inc., Philip S., Los Tablos, New Mexico.
Huse-Liberty Mica Co., 73 Long Wharf, Boston, Mass.
International Mica Co., 3660 Brandywine, Philadelphia, Pa
Kant Krack. See Huse Liberty Mica Co.
Keene Mica Co., Keene, N. H.
Macallen Co., Boston 27, Mass.
Micabond. See Chicago Mica Co.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Miralite. See Mitchell-Rand Mfg. Co.
Mica Insulator Co., 200 Varick, New York, N. Y.
Mica Mfg. Co., 135 Johnson, Brooklyn, N. Y.
Micanite. See Mica Insulator Co.
Mica Products Mfg. Co., 54 Greene, New York, N. Y.
Munsell & Co., Eugene, 200 Varick, New York, N. Y.
Nemco. See New England Mica Co.
New England Mica Co., Waltham, Mass.
New England Minerals, Inc., 85 Devonshire, Boston, Mass
New York Mica & Mfg. Co., Auburn, N. Y.
Peerless. See New England Mica Co.
Prestonite. See Robt. K. Preston Mica Co.
Preston Mica Co., Robt. K., 957 Monadnock Blk., Chicago (Ground Mica.)
Red Streak. See Huse Liberty Mica Co.
Rogers-Pyatt Shellac Co., 81 Water St., New York. (Imp.)
Schoonmaker Insulation Co., A. O., 34 University Place, New York, N. Y.
Storrs Mica Co., 11 Park Place, New York, N. Y.
Tar Heel Mica Co., Plumtree, N. C.
Watson Bros., 170 Purchase, Boston, Mass.

MINIATURE SWITCHBOARD SYSTEMS. See Instruments, Portable and Switchboard.
MIXERS, INSULATION. See Insulation Mixers.

MOLDED
Presses. See Presses, Molded Insulation.
Radio Parts. See Radio Molded Parts.
Shades. See Molded Insulation.

MOLDED INSULATION
Aico. See American Insulator Corp
Allen & Hills, Inc., Auburn, N. Y.
Ambler Asbestos Shingle & Sheathing Co., Ambler, Pa. (Cold.)
Amblerold. See Ambler Asbestos Shingle & Sheathing Co.
American Insulator Corp., New Freedom, Pa.
American Machine & Foundry Co., 5520 Second Ave., Brooklyn, N. Y.
Amerine. See American Insulator Corp.
Anderson Mfg. Co., Albert & J. M., 289 A, Boston, Mass.
Auburn Button Wks., 48 Canoga, Auburn, N. Y.
Bakelite Corp., 247 Park Ave., New York, N. Y.
Bay State Moulding Co., 1197 Dorchester Ave., Boston.
Belden Mfg. Co., 2310B S. Western Ave., Chicago, Ill
Beldenmold. See Belden Mfg. Co.
Bell Mfg. Co., 11 Elkins, Boston, Mass. Radio Parts.
Bettis. See Synthetic Plastics Co., Inc.
Boonton Molding Co., Boonton, N. J.
Boonton Rubber Mfg. Co., 223 Fanny Rd., Boonton, N. J.
Brewlite Moulding Corp., 109 Hudson, Jersey City, N. J (Wood Composition.)
Celluloid Corp., 10 E. 40th, New York, N. Y.
Cepco. See Monowatt Corp.
Cetec. See Monowatt Corp.
Cetelite. See Monowatt Corp.
Celtrock. See Colt's Patent Firearms Mfg. Co.
Chicago Molded Products Co., 2149 Walnut, Chicago Ill.
Cincinnati Molding Co., 2037 Florence Ave., Cincinnati, O
Colaste Co., Hoosick Falls, N. Y.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn
Compo-Site, Inc., 207 Astor, Newark, N. J.
Condensite. See Bakelite Corp.
Connecticut Elec. Mfg. Co., Bridgeport, Conn.
Continental-Diamond Fibre Co., Bridgeport, Pa.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Dayton Insulating Moulding Co., 434 E. First, Dayton, Ohio
Diemoulding Production Co., Canastota, N. Y
Dimec. See Dayton Insulating Moulding Co
Durez. See General Plastics, Inc.
Electrose. See Insulation Mfg. Co.

GARFIELD MOLDED COMPOSITIONS

Reduce Costs Strong Heat Proof

GARFIELD MANUFACTURING CO.

Garfield, N. J. *Established 1908*

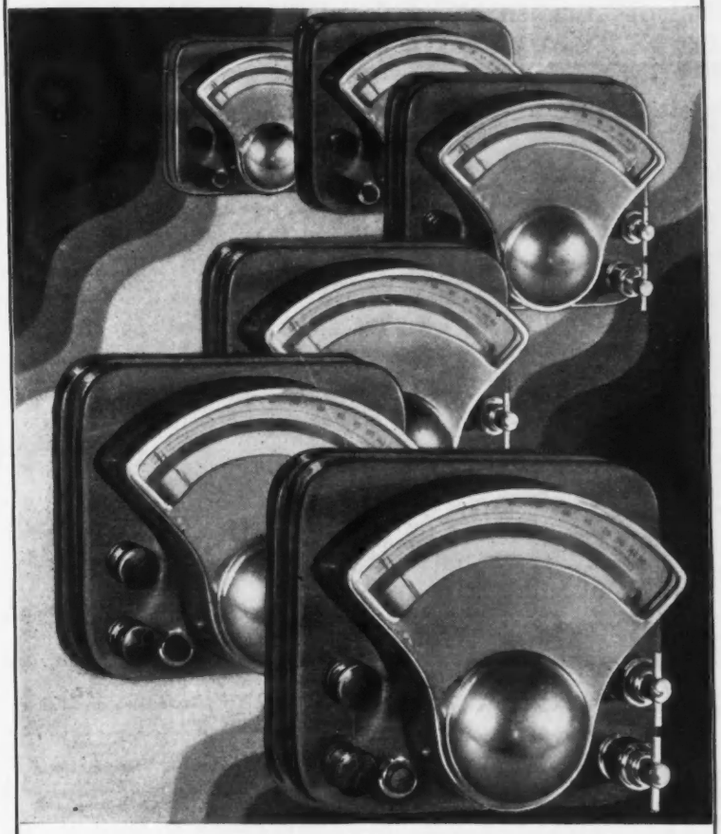
Erinold Co., Park Row Bldg., New York, N. Y.
Evercool. See Bakelite Corp.
Formica Insulation Co., 4638 Spring Grove Ave., Cincinnati
Garfield Mfg. Co., Garfield, N. J. Composition. (Cold.)
General Electric Co., Schenectady, N. Y.
General Moulded Composition Co., 212 Market, Lynn, Mass.
General Plastics, Inc., 119 Walck Rd., N. Tonawanda, N. Y.
Gummoi. See Garfield Mfg. Co.
Hann Mfg. Co., Harry W., 623 S. San Pedro, Los Angeles, Cal.
Herculite. See Colosta Co.
Hi-Heet. See Insulation Mfg. Co.
Imperial Molded Products Co., 2925 W. Harrison, Chicago.
Improco. See Insulation Products Co.
Inda. See American Machine & Foundry Co.
Insulation Mfg. Co., New York Ave. and Herkimer St., Brooklyn, N. Y.
Insulation Products Co., Richland, Pittsburgh, Pa.
Insuline Corp. of America, 78 Cortlandt, New York, N. Y.
International Insulating Corp., Wyria, O.
Karolith Corp., 189 13th, Long Island City, N. Y. (Casein plastics.)
Kellite. See Kellogg Switchboard & Supply Co.
Kellogg Switchboard & Supply Co., 1066 W. Adams, Chicago, Ill.
Klagges, Chas., 128 147th, Ozone Park, N. Y.
Kurz-Kasch Co., Dayton, O.
Lacanite. See Scranton Button Co.
Luco Products Corp., 40 Flatbush Ave. Extension, Brooklyn, N. Y.
Lumarith. See Celluloid Corp.
Luxite. See Wilbur & Williams Co.
Macallen Co., Boston, 27, Mass.
Mack Molding Co., Wayne, N. J.
Makalot. See Johnson Molding & Tool Co.
Megohom. See Waterbury Button Co.
Micarta Fabricators, Inc., 309 Canal, New York, N. Y.
Micarta. See Westinghouse Elec. & Mfg. Co.
Mico. See Molded Insulation Co.
Modern Molded Products Co., Blount and Elm Sts., Providence, R. I.
Molded Insulation Co., Mt. Vernon, N. Y.
Monowatt Corp., 24 W. 40th, New York, N. Y.
New England Products Co., 232 Greenwich, New York, N. Y.
Niagara Insul-Bake Specialty Co., 483 Delaware Ave., Albany, N. Y.
Noark. See Colt's Patent Fire Arms Mfg. Co.
Norloc. See Norton Laboratories, Inc.
Northern Industrial Chemical Co., 11 Elkin, South Boston.
Norton Laboratories, Inc., 1025 Mill, Lockport, N. Y.
Panolyte Corp., Trenton, N. J.
Paramix. See Solitdorf Radio Corp.
Paratherm. See Scranton Button Co.
Phenolic. See Scranton Button Co.
Plastic Molding Corp., Sandy Hook, Conn. (Cold.)
Pollopas. See Wilbur & Williams.
Pruven Composition Products Corp., Milford, Conn
Pruvenite. See Pruven Composition Products Co
Pyrolax. See Cutler-Hammer Mfg. Co.
Recto Mfg. Co., 23 W. 3rd, Cincinnati, O.
Redmonol. See Bakelite Corp.
Rexlite. See Northern Industrial Chemical Co
Reynolds Spring Co., Jackson, Mich.
Reynoldite. See Reynolds Spring Co.
Reynomold. See Reynolds Spring Co.
Richardson Co., Lockland, Cincinnati, O.
Ridgelite. See Ridgley Trimmer Co.
Ridgley Trimmer Co., Springfield, O.
Schneider Bros., Inc., 312 N. Sheldon Ave., Chicago.
Scranton Button Co., Scranton, Pa.
Shaw Insulator Co., Irvington, Newark, N. J.
Siemon Co., State and Dewey, Bridgeport, Conn.
Specialty Insulation Mfg. Co., Hoosick Falls, N. Y.
Star Insulate. See Insulation Mfg. Co.
Starite. See Insulation Mfg. Co.
Stokes Rubber Co., Jos., Trenton, N. J.
Stokes & Smith Co., Summerdale Ave. near Roosevelt Blvd., Philadelphia, Pa.
Synthetic Plastic Co., Inc., 535 Fifth Ave., New York, N. Y. (Molding Powder).
Textolite. See General Elec. Co.
Thermoplax. See Cutler-Hammer Mfg. Co.
Tegit. See Garfield Mfg. Co.
Union Insulating Co., Parkersburg, W. Va.
Vulcabeston. See Colt's Patent Fire Arms Mfg. Co.
Vulcanized Rubber Co., 251 Fourth Ave., New York, N. Y.
Waterbury Button & Moulding Co., Waterbury, Conn.
Watertown Mfg. Co., Watertown, Conn.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa
Wilbur & Williams Co., 261 Park Square Bldg., Boston, Mass. (Molding Powder.)

MOLYBDENUM
American Electro Metal Corp., 65 Madison Ave., New York, N. Y.
Elkon, Inc. (Div. of P. R. Mallory Co.), 350 Madison Ave., New York, N. Y.
Lohfeld & Co., J. L., 53 Park Place., New York, N. Y.
Palatine Industrial Co., 111 Fifth Ave., New York, N. Y.
Radiotherma, Inc., 45 E. 17th, New York, N. Y.
Sirian Wire Co., 255 Sherman Ave., Newark, N. J.

MONEL METAL
International Nickel Co., 67 Wall, New York, N. Y.
MOTOR CONTROLLERS. See Controllers, Motor.
MOTOR PLATFORM BASES. See Bases, Motor Platform
MOTOR STARTERS. See Controllers, Motor; Switches, Remote Control; Switches, Motor Starting; Safety; Switches Snap (Heavy Duty)

MOTORS
Alternating Current .....See S
Direct Current .....See S
Motors, 1 Hp. up .....See M
Motors Fractional Hp. .....See F
Universal .....See U
Actodector. See Roth Bros. Co., Div. of Century Electric Co
Advance Elec. Co., 4311 Maple Ave., St. Louis M F S . .

These could be made of DUREZ . . .



Wattmeter. Using Durez, these will be strong, hard, tough. Acids, moisture, gases, steam will have no effect on delicate parts. Lettering, designing and the mottled surface will be made in one operation. Colors can be used. *One of countless Durez applications.*

. . . then they would be

Light
Non-brittle
Acid and alkaline resistant
HEAT AND MOISTURE RESISTANT ★
Perfectly insulated
Beautiful
Durable — strong
Uniform in any quantity
Complete without tooling or polishing
Made in one operation
Economical

DUREZ
The perfect molding compound

★ HEAT AND MOISTURE RESISTANT

MANY a product, otherwise satisfactory, fails because of its vulnerability to destructive agents. Radio manufacturers frequently switch to Durez for that very reason! So much so, that metals, porcelain, wood, hard rubber, glass, ivory and other materials are rapidly giving way to this perfect molding compound. Durez resists heat, acids and moisture!

Yet the mechanical and physical stability of Durez—even under the most exacting conditions—is but one of its many advantages. Durez has high dielectric strength. It is quickly and easily molded—in one operation! In that operation, holes can be made, studs imbedded, threads molded, intricate designing cared for. No tooling, burnishing or polishing is necessary. And no matter how many parts you make, each will be exactly like the other.

What do you make? Is it continually subjected to deteriorating agencies? Is your present material adequate to fight them? Investigate Durez! Learn how this amazing material can give your product durability, added efficiency and beauty—*economically!* (Durez comes in all practical colors—colors that can be blended, striated, mottled as you want them.) You owe it to yourself and your production line to try Durez!

Durez engineers and laboratory staff will gladly co-operate with you on any problem. Address General Plastics, Inc., 119 Walck Road, North Tonawanda, N.Y. Also New York, Chicago, San Francisco, Los Angeles.

Write for this free booklet—"Do It With Durez." Contains complete information about Durez—physical and dielectric properties, color ranges, and scores of possible applications.

Name Plates
ETCHED—ALL METALS
SERIAL PLATES
ETCHED AND LITHOGRAPHED
INSTRUMENT FACE PLATES
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RADIO ESCUTCHEONS AND METAL PANELS
General Etching & Mfg. Co.
3072-82 W. Grand Ave. Chicago, Ill.

MOTORS—Continued
Allis-Chalmers Mfg. Co., Milwaukee, Wis..... M . . S . .
Allis Co., Louis, Milwaukee, Wis..... M . . S . .
American Elec. Motor Co., Cedarburg, Wis..... M . . . . .
Apex Elec'l Mfg. Co., 1067 E. 152nd, Cleveland .. F S U
Armor Elec. Mfg. Co., 1020 Holland, Erie, Pa. M . . . . .
Baldor Elec. Co., 4352 Duncan Ave., St. Louis M F S . .
B-Line. See Brown-Breckmeyer Co.
Bodine Elec. Co., 2254 Ohio, Chicago..... .. F S U
Bogue Elec. Co., Chas. J., 132 King, New York M . . . . .
Brown-Breckmeyer Co., Norwood Power Bldg., Dayton, O..... M F . . .
Burke Elec. Co., Erie, Pa..... M F S U
B. T. See Allis Co., Louis.
B & R Mfg. Co., 812 Lafayette, Toledo, O..... .. F . . .
Century Elec. Co., 1806 Pine, St. Louis, Mo.. M F S . .
Chandeysson Elec. Co., St. Louis, Mo..... M . . S . .
Clark, Jr., Elec. Co., James, 600 E. Bergman, Louisville, Ky. ..... M . . . . .
Cleveland Armature Wks., 4732 St. Clair Ave., Cleveland, O. ..... M . . S . .
Comet Elec. Co., 47 Union Trust Bldg., Indianapolis, Ind.
Continental Elec. Co., 14 Magazine, Newark.. M . . S . .
Crocker-Wheeler Elec. Mfg. Co., Ampere, N. J. M . . S U
Cushman Elec. Co., Concord N. H..... M F S . .
Day-Fan Electric Co., Dept. 4, Dayton, O..... .. F S . .
Diehl Mfg. Co., Elizabeth, N. J..... M F S . .
Diverter Pole. See Rochester Elec. Product Co.
Domestic Electric Co., 7209 St. Clair Ave., Cleveland, O. .... S U
Dumore Co., 35 16th, Racine, Wis..... .. F . . U
Eclipse. See Fidelity Elec. Co.
Electric Machinery Co., Minneapolis, Minn.. M . . S . .
Electric Products Co., 1725 Clarkstone Rd., Cleveland, O. .....
Electric Specialty Co., 221 South Stamford, Conn. M F S U
Electro-Dynamic Co., Bayonne, N. J..... M . . S . .
Emerson Electric Mfg. Co., 2014 Washington Ave., St. Louis, Mo. ..... M F S U
Engberg's Elec. & Mechl. Works, St. Joseph, Mich. ..... M . . S . .
Esco. See Electric Specialty Co.
Fairbanks-Morse & Co., 900 S. Wabash Ave., Chicago, Ill. ..... M F . . .
Fidelity Elec. Co., Lancaster, Pa..... .. F S U
Fitzgerald Mfg. Co., Torrington, Conn..... .. F . . .
Fynn Welchsel. See Wagner Elec. Corp.
Galvin Elec. Mfg. Co., 2314 S. Broadway, St. Louis, Mo. ..... F . . S . .
General Elec. Co., Schenectady, N. Y..... M F S U
Gilbert Co., A. C., New Haven, Conn..... .. F . . U
Hamilton Beach Mfg. Co., Racine, Wis..... .. F S U
Hobart Bros. Co., Troy, O..... M . . S . .
Holtzer-Cabot Elec. Co., 125 Amory, Boston... M F S . .
Howell Elec. Motors Co., Howell, Mich..... M . . S . .
Ideal Elec. & Mfg. Co., Mansfield, O..... M . . S . .
Imperial Electric Co., Akron, O..... M . . S . .
Janette Mfg. Co., 551 W. Monroe, Chicago..... .. F S . .
Jantz & Leist Elec. Co., Cincinnati, O..... M F . . .
Jeannin Electric Co., Fassett & N. Y. C. R. R. Toledo, O. ..... M F S . .
Kendrick & Davis Co., Lebanon N. H..... .. F S . .
Kimble Elec. Co., 634 N. Western Ave., Chicago M . . S U
Knapp Elec., Inc., Portchester, N. Y..... .. F S U
Leland Elec. Co., Dayton, O..... .. F S . .
L. E. See Leland Elec. Co.
Lincoln Elec. Co., Cleveland, Ohio..... M . . S . .
Line-Weld. See Lincoln Elec. Co.
Linzee Elec. Motor Co., Mansfield, O..... M . . . . .
Mando Co., 911 State Tower Bldg., Syracuse, N. Y. (6-12-40 Volt only)..... . . F . . . .
Marathon Elec. Mfg. Co., 32 Island, Wausau, Wis. .. F . . . .
Marble-Card Elec. Co., Gladstone, Mich..... M . . . . .
Master Electric Co., Dayton, O..... M F S . .
MC. See General Electric Co.
Michigan Elec. & Mfg. Co., Lake Linden, Mich. .. F S . .
N. C. See Electric Controller & Mfg. Co.
Norfolk. See Walter Elec. Mfg. Co.
North East Elec. Co., Rochester, N. Y..... .. F . . U
Northwestern Mfg. Co., 480 Clinton, Milwaukee M . . . . .
Ohio Elec. & Controller Co., 5903 Maurice Ave., Cleveland, Ohio .... F S . .
O. K. See Marathon Elec. Mfg. Co.
Osann Co., F., 245 Seventh Ave., New York M . . . . .
Peerless Elec. Co., 740 W. Market St., Warren, O. M F S U
Polar Cub. See Gilbert Co., A. C.
Pow-R-Pull. See Wagner Elec. Corp.
Reco. See Reynolds Electric Co.
Red Band. See Howell Elec. Motors Co.
Reliance Elec. & Engrg. Co., 1042 Ivanhoe Rd., Cleveland, O. ..... M . . S . .
Reynolds Electric Co., 2650 W. Congress, Chicago .. F S . .
Robbins & Myers, Inc., Springfield, O..... M F S U
Roth Bros. & Co., Div. of Century Elec. Co., 1400 W. Adams, Chicago, Ill..... M F S . .
Standard. See Robbins & Myers Co.
Star Elec. Motor Co., Miller St. & N. J. R. R. Ave., Newark, N. J ..... M . . S . .
Sterling Elec. Motors, Inc., Telegraph Rd. and Atlantic Blvd., Los Angeles, Cal..... M . . S . .
Stow Mfg. Co., Binghamton, N. Y. ..... M F S U

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Springfield Mass.

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Electrical Insulating Varnishes and Compounds
IMPERVIOUS VARNISH CO.
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436 Seventh Avenue, Pittsburgh, Penna.

Sturtevant Co., 15 Devonshire (Hyde Park), Boston, Mass. ..... M F S U
Sunlight Electrical Mfg. Co., Warren, O..... .. F S . .
Super Wick. See Master Elec. Co.
Switch start. See Lincoln Elec. Co.
Union Elec. Motor Mfg. Co., Hancock & Oxford Sts., Philadelphia, Pa. ..... M F S . .
U. S. Elec. Mfg. Co., 200 E. Slawson Ave., Los Angeles ..... M . . S . .
Valley Elec. Co., 4221 Forest Park Blvd., St. Louis, Mo. ..... M . . S . .
Wagner Elec. Corp., 6400 Plymouth Ave., St. Louis, Mo. ..... M F S U
Walter Elec. Mfg. Co., Norfolk, Va..... M . . S . .
Watson. See Allis Co., Louis.
Welco Uniframe. See Wesche Elec. Co., B. A.
Wesche Elec. Co., B. A., 1622 Vine, Cincinnati M F S . .
Westinghouse Elec. Mfg. Co., East Pittsburgh M F S . .
Willey-Wray Elec. Co., 1522 Central Parkway, Cincinnati, O. ..... M . . S . .
Woods Mach. Co., S. A., Boston..... M F S . .
Zobell Elec. Motor Co., Garwood, N. J..... M . . S . .

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American Name Plate Co., 117 Imlay, Brooklyn, N. Y.
Angell Embossing Co., 37 Barney-Smith Co., Dayton, O.
Chandler Co., Springfield, Mass.
Continental-Diamond Fibre Co., Bridgeport, Pa.
Crowe Name Plate & Mfg. Co., 1749 Grace, Chicago, Ill.
Electro-Chemical Engraving Co., 52 Vanderbilt Ave., New York, N. Y.
Etched Products Corp., 90 Tenth, Long Island City, N. Y.
Etching Co. of America, 1520 Montana, Chicago, Ill.
General Etching & Mfg. Co., 3070 W. Grand Ave., Chicago, Ill.
Grammes & Sons Inc., L. F., Allentown, Pa.
Premier Metal Etching Co., 14th & Van Alst Ave., Long Island City, N. J.
Turner Brass Works, Sycamore, Ill.
Waterbury Button & Moulding Co., Waterbury, Conn.

NICKEL
American Mond Nickel Co., Century Bldg., Pittsburgh, Pa.
Driver-Harris Co., Harrison, N. J.
International Nickel Co., 67 Wall, New York, N. Y.
National-Harris Wire Co., 195 Verona Ave., Newark, N. J.
Seymour Mfg. Co., Seymour, Conn.

NOTCHING MACHINES, Armature
Ferracute Machine Co., Bridgeton, N. J.
Niagara Machine & Tool Wks., 637 Northland Ave., Buffalo, N. Y.

NUT SETTING MACHINES
Vim Electric Tool Co., 149 Broadway, New York, N. Y.

OHMMETERS. See Instruments, Laboratory Standard; also Instruments, Portable and Switchboard.

OIL-LESS BEARINGS. See Bearings, Oil-less.

OSCILLOSCOPES. See Instruments, Laboratory Standard.

OVENS, Industrial and Laboratory
Annealing, Temper Drawing, Mold Baking, Vulcanizing, Drying, Conditioning, Enameling, Japanning, Vacuum Impregnating.
Buffalo Fdry. & Machine Co., 1543 Fillmore, Buffalo, N. Y. (Armature and Coil.)
Conran, Frederick M., 107 Colden, Newark, N. J.
Crawford Oven Co., New Haven, Conn. (Coil Driers.)
Despatch Oven Co., 622 Ninth, S. E., Minneapolis, Minn.
Detroit Sheet Metal Wks., 1341 E. Milwaukee Ave., Detroit, Mich.
Devine Mfg. Co., J. P., Mount Vernon, Ill.
Eberbach & Son Co., Ann Arbor, Mich. (Drying.)
Electric Heat Control Apparatus Co., 245 New Jersey R. R. Ave., Newark, N. J.
Emerson Apparatus Co., Melrose, Mass. (Conditioning.)
Frass Thermo Elec. Co., 1206 Grove, Irvington, N. J.
Gehnrich Indirect Heat Oven Co., Long Island City, N. Y.
General Electric Co., Schenectady, N. Y.
Hayes, C. I., 129 Baker, Providence, R. I.
Heidbrink Co., 2633 Fourth Ave., S., Minneapolis, Minn.
Hynes & Cox Elec. Corp., 406 N. Pearl, Albany, N. Y.
Kenworthy, Chas. F., 198 Piedmont, Waterbury, Conn.
Lydon Bros., 229 Colden, Jersey City, N. J.
Maehler Co., Paul, 2210 Lake, Chicago, Ill.
Miho Co., 717 Sycamore, Cincinnati, O.
Radio Elec'l Wks., 150 W. 22nd, New York, N. Y.
Sargent & Co., E. H., 155 E. Superior, Chicago, Ill.
Sioux Battery & Mfg. Co., Sioux City, Ia. (Battery.)
Standard Elec. Stove Co., Toledo, Ohio.
Steiner & Co., E. E., 197 E. Kinney St., Newark, N. J.
Stokes Machine Co., F. J., 5834 Tabor Rd. (Olney), Philadelphia.
Swartwout Co., 18522 Euclid Ave., Cleveland, O.
Thelco. See Frass Thermo Elec. Co.
Westinghouse Elec. & Mfg. Co., Mansfield, O.
Young Bros. Co., 6521 Mack Ave., Detroit, Mich.

OXIDES, Battery. See Chemicals, Battery.

PACKING
Cooke Seal Ring, Dept. T, 46 N. Green St., Chicago, Ill.
Federal Metallic Packing Co., Wakefield, Mass.
Holed-Tite Packing, Inc., 100 E. 42nd, New York, N. Y.
Packtite. See Federal Metallic Packing Co.

PAINT, Varnish, Lacquer KEY
Varnishes, Insulating .....See V
Painting, Dipping, Spraying, Vacuum Impregnating.
Paint, Insulating and Acid Proof..See P
Lacquer, Metal Finishing .....See L
Acme White Lead & Color Wks., 8250 St. Aubin Ave., Detroit, Mich. L
Ajax. See Sherwin-Williams Co.
Alaka. See Lacquer & Chemical Corp.
American Di-Electrics, Ltd., Hancock and Bodine, Long Island City, N. Y. ..... V . . . .

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American Lastite Co., 3166 Lincoln Ave., Chicago.. . . P L
American Wurtzilite Co., Builders Bldg., Chicago .. P . .
Antakwa Co., 1329 Mohawk, Chicago, Ill..... . . P . .
Arizona Lacquer Mfg. Co., 7 16th, Brooklyn, N. Y. . . . L
Armlac. See Robertson Chemical Co.
Arolac. See Arizona Lacquer Mfg. Co.
Art-Craft. See Southwestern Paint & Varnish Co.
Atlantic Chemical Co., Colt, Irvington, N. J..... . . . L
Atom Chemical Co., 96 E. 10th, New York, N. Y. L
Bakelite Corp., 147 Park Ave., New York, N. Y. L
Benolite Varnish Co., 501 Columbia Bank Bldg., Pittsburgh ..... V P . .
Berry Bros., Leib & Wight, Detroit, Mich..... V . . . .
Billings-Chapin Co., 1163 E. 40th, Cleveland, O.. V . . .
Biwax Corp., 208 S. La Salle, Chicago, Ill..... . . P . .
Bradley-Hurtz Co., 2620 S. Dearborn, Chicago, Ill. L
Brevolite. See Waukegan Chemical Co.
Calman & Co., Emil, 42 Vernon Blvd., Long Island City, N. Y. ..... V P . .
Carboloid Products Corp., 15 Park Row, New York, V P . .
Chadeloid Chemical Co., 75 E 45th, New York. V . . .
Chinalac. See Dolph Co., John C.
Cochrane Chemical Co., 422 Danforth Ave., Jersey City, N. J. ..... V P . .
Code 25. See Mitchell-Rand Mfg. Co.
Columbus Varnish Co., 264 Cozzens, Columbus, O. V . . .
Comulac. See Martindale Elec. Co.
Continental-Diamond Fibre Co., Bridgeport, Pa. V . . .
Day & Co., James B., 1872 Clybourn Ave. Chicago, Ill. .... P L
Doe & Co., Walter S., Kent, Ohio..... V P . .
Dolph Co., John C., 168 Emmet, Newark, N. J.. V P . .
Duco. See Du Pont de Nemours & Co.
Du Pont de Nemours & Co., Wilmington, Del.... P . .
Durez. See General Plastics.
Eastman Kodak Co., Rochester, N. Y..... . . L
Eclipse Paint & Mfg. Co., Cleveland, O..... P . .
E. B. See Mitchell-Rand Mfg. Co.
Egyptian Lacquer Mfg. Co., 90 West, New York..... L
Electric Lacquer. See Dolph Co., John C.
Enamelac. See Robertson Chemical Co.
Ever-Brite Products Co., East Liverpool, O..... L
Ferbert-Schorndorfer Co., 12815 Elmwood Ave., Cleveland, O. ..... V P L
Fesco. See Ferbert-Schorndorfer Co.
Five Point. See American Wurtzilite Co.
Franche & Co., 440 Orleans, Chicago, Ill..... . . L
General Elec. Co., Bridgeport, Conn..... V P . .
General Plastics, Inc., 119 Walck Rd., N. Tonawanda, N. Y. ..... V . . . .
George Co., P. D., 4153 Bingham Ave., St. Louis. V . . .
G. E. See General Elec. Co.
Glidden Co., Cleveland, O..... V P L
Glyptal. See General Electric Co., Schenectady.
H. B. See Maas & Waldstein Co.
Hilo Varnish Corp., Marcy & Flushing Aves., Brooklyn, N. Y. ..... V P L
Impervious Varnish Corp., 421 Wood, Pittsburgh. V P . .
Insulaterite. See Ohmlac Paint & Refining Co.
Insulvar. See Varflex Corp.
Irvington Varnish & Insulator Co., Irvington, N. J. V P L
Kodalak. See Eastman Kodak Co.
Krakles. See Waukegan Chemical Co.
Lackerite. See Twin City Shellac Co., Inc.
Lacquer & Chemical Corp., 214-40th St., Brooklyn, N. Y. .... P L
Laqueroid. See Glidden Co.
Liberty. See Antakwa Co.
Linolac. See Mica Insulator Co.
Lowe Bros. Co., 450 E. 3rd, Dayton, O..... V P . .
Lucas & Co., John, 322 Race, Philadelphia, Pa.. V P . .
Lucote. See Lucas & Co., John.
Maas & Waldstein, 438 Riverside Ave., Newark, N. J. L
McDougall-Butler Co., Inc., Evans Water & Norton, Buffalo, N. Y. ..... V P . .
Martindale Elec. Co., 1262 W. Fourth, Cleveland, O. ..... V . . . .
Mawalac. See Maas & Waldstein.
Mecco. See Henry V. Walker Co.
Mica Insulator Co., 200 Varick St., New York..... V . . . .
M. I. C. See Mica Insulator Co.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y. V P . .
Nepto Lac. See Lowe Bros. Co.
Nikolas & Co., G. J., 1227 W. Van Buren, Chicago. . . . L
O'Brien Varnish Co., South Bend, Ind..... V P L
Ohmlac Refining Co., 140 S. Dearborn, Chicago, Ill. .. P . .
Opex. See Sherwin-Williams Co.
Ozite. See Standard Underground Cable Co.
P & B. See Ruberoid Co.
Pecora Paint Co., 4th & Sedgeley Ave., Philadelphia, Pa. L
Pedigree. See George Co., P. D.
Peninsular Paint & Varnish Co., Detroit, Mich. . . . L
Peerless. See Maas & Waldstein Co.
Proxilin. See Acme White Lead & Color Wks.
Pruett-Schaeffer Chemical Co., Taber, Pittsburgh. .. P L
Reliable Leather Dressing Co., 43 Crescent, Long Island City, N. Y. ..... V . . . .
Republic Varnish Co., 200 Thomas, Newark, N. J. V . . .
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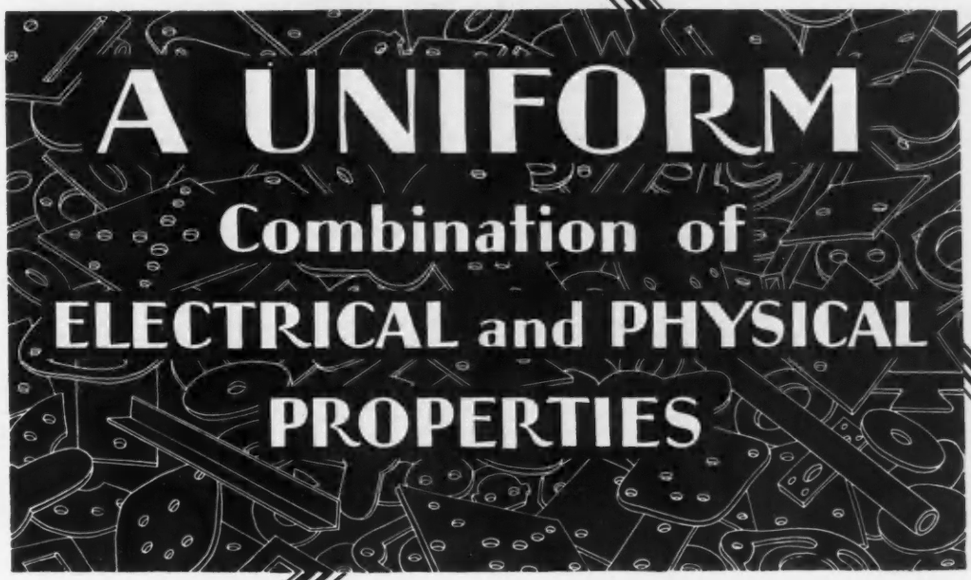

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Schorndorfer, Ferbert, 12815 Elmwood Ave., Cleveland, O..... V P . .
Sherwin-Williams Co., Cleveland, O..... V P L
Sipe & Co., James B., Chamber of Commerce Bldg., Pittsburgh, Pa..... . . . L
Southwestern Paint & Varnish Co., 610 Broadway, Kansas City, Mo..... V P . .
Standard Flexible Comp. Co., 1213 Franklin Trust Bldg., Philadelphia, Pa..... V P . .
Standard Insulation Co., Rutherford, N. J..... V . . .
Standard Lacquer Co., 621 Broadway, New York. L
Standard Underground Cable Co., Div. of General Cable Corp., Pittsburgh, Pa..... . P . .
Standard Varnish Wks., 443 4th Ave., New York. V P L
Sterling Varnish Co., Haysville, Pa..... V . . .
Toch Bros., 443 4th Ave., New York..... V P L
Truscon Laboratories, Canift & Grand Trunk Railway, Detroit, Mich..... V . . .
2098. See Mitchell-Rand Mfg. Co.
Twin City Shellac Co., Inc., 338 Flushing Ave., Brooklyn, N. Y..... V P L
Varflex Corp., Rome, N. Y..... V . . .
Voltax Co., 99 Reservoir Ave., Bridgeport, Conn. V P . .
Walpole. See Robertson Chemical Co.
Waukegan Chemical Co., North Chicago, Ill..... . . . L
Walker Co., Henry V., 17 John St., New York..... . . . L
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa. V P . .
Zapon Co., Stamford, Conn..... . . . L
Zellac. See Zeller Lacquer Mfg. Co.
Zeller Lacquer Mfg. Co., 20 E. 49th, New York. L

PANELS (panel) Engraving. See Engraving.
Radio (Metal). See Radio Mountings.
Radio (Molded). See Radio Molded Parts.
Radio (Hard Rubber) See Rubber Hard.
Meters. See Instruments, Portable & Switchboard

PAPER
Boxes. See Boxes & Wrappers.
Bushings. See Tubes, Paper.
Candles. See Candles, Fixture.
Cores. See Tubes, Paper.
Fibre. See Cloth and Paper.
Fish. See Cloth & Paper.
Insulating. See Cloth and Paper.
Parchment. See Parchment Paper.
Shades. See Shades, Fabric.
Sleeves. See Tubes, Paper.
PARAFFINE. See Wax and Compounds.

PATENT ATTORNEYS
Sargent, Lester L., 1115 K Street, Washington, D. C.

PARCHMENT PAPER, Lamp Shade
Angel H. Reeve & Co., 7 Spruce, New York, N. Y.
Bergstrom Paper Co., Neenah, Wis.
Bradley Mfg. Co., A. J., 101 Beekman, New York, N. Y.
Brown Paper Co., L. L., Adams, Mass.
Chicago Rawhide Mfg. Co., 1301 Elston Ave., Chicago, Ill
De Jonge & Co., Louis, 69 Duane, New York, N. Y.
New York & Penn Co., 200 5th Ave., New York, N. Y.
Paterson Parchment Paper Co., Passaic, N. J.
Raquette River Paper Co., Potsdam, N. Y.
Reeve & Co., Angel H., 7 Spruce, New York, N. Y.
Special Paper Mfg. Co., 96 Reade, New York, N. Y
Strype, Fred C., 140 Lafayette, New York, N. Y.
Taylor-Logan Co., Holyoke, Mass.
Union Paper & Twine Co., 116 St. Clair Ave., N. W. Cleveland, O.
Warren Parchment Co., Dexter, N. Y.
Weber Co., F., 1220 Buttonwood, Philadelphia, Pa.
West Carrollton Parchment Co., West Carrollton, O.
Windsor Locks Paper Mills Co., Windsor Locks, Conn.

PEGS, Armature
Estes & Sons, E. B., 5844 Grand Central Terminal Bldg., New York, N. Y.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
National Vulcanized Fibre Co., Wilmington, Del.
Standard Fibre Products Co., 36 Pleasant, Watertown, Mass.
White Supply Co., 4347 Duncan, St. Louis, Mo.

PENS, Scorching
Gilbert Supply Co., Independence, Iowa.
Little Speedster. See Gilbert Supply Co.
Post Elec. Co., 7 E. 44th, New York, N. Y.
Stylectric. See Post Electric Co.

PERFORATING MACHINES
American Perforator Co., 617 W. Jackson, Chicago, Ill.
Asam Bros., 917 Arch, Philadelphia, Pa.
Asam Wright. See Asam Bros.
Capital Novelty Co., Lincoln, Neb.
Cummings Co., B. F., 4740 Ravenswood Park, Chicago, Ill
Hamilton Engrg. Products Co., Hamilton, Ohio (Muscle Rolls).

PHENOLIC INSULATION. See Fibre, Phenol. Also Molded Insulation.

PHOSPHOR BRONZE
(Ingot, Rod, Sheet, Wire)
American Brass Co., Waterbury, Conn.
Anaconda. See American Brass Co.
Elephant Brand. See Phosphor-Bronze Smelting Co.
Gilby Wire Co., Riverside Ave., Newark, N. J.
Phosphor-Bronze Smelting Co., 2200 Washington Ave., Philadelphia, Pa.
Scovil Mfg. Co., Waterbury, Conn.
Western Cartridge Co., East Alton, Ill.

PHOTO-ELECTRIC TUBES
Burt, R. C., 327 S. Michigan Ave., Pasadena, Cal.
Foto Cell. See Raytheon Mfg. Co.
General Electric Co., Schenectady, N. Y.

G-M Laboratories, Inc., Grace & Ravenswood Ave., Chicago.
Kino-Lamp. See Raytheon Mfg. Co.
National Carbon Co., New York, N. Y.
Photon Instrument Corp., 574 Southern Blvd., New York.
Radio Elec'l Wks., 150 W. 22nd, New York, N. Y.
Visitron. See G-M Laboratories, Inc.
Westinghouse Elec. & Mfg. Co., Mansfield, Ohio.

PHOTOMETERS, Lamp Testing
Biddle, James G., 1211 Arch, Philadelphia, Pa.
Foote, Pierson & Co., 75 Hudson, Newark, N. J.
Holophane Co., 342 Madison Ave., New York, N. Y.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa
Luxometer. See James G. Biddle.
Mathews. See Foote, Pierson & Co.
National Lamp Wks of G. E. Co., Cleveland, O.

PICK-UPS, TALKING MACHINE. See Loud Speakers.

PIGTAILS, Commutator. See Brushes, Commutator.
Wire Gauze. See Brushes, Commutator.
Vacuum Cleaner. See Brushes for Vacuum Cleaners.

PINIONS. See Gears and Pinions.
PINION PULLERS. See Pullers, Armature Shaft.
PLASTICS. See Molded Insulation.
PLATES, Name. See Name Plates; Also Decalcomania
Fixture Outlets. See Fixture Fittings.
Storage Battery. See Plates, Storage Battery
Gray Instrument Co., 64½ W. Johnson, Philadelphia, Pa

PLATES, Storage Battery
Are Elec'l Corp., 211 E. Columbia, Fort Wayne, Ind.
Champion. See Englert Mfg. Co.
C. & B. Battery Co., 1535 S. State, Chicago, Ill.
Edes Mfg. Co., Plymouth, Mass.
Englert Mfg. Co., 2500 Jane, Pittsburgh, Pa.
Exin. See New Jersey Storage Battery Co.
Fort Wayne Battery Mfg. Co., 230 E. Fourth, Ft. Wayne.
Handler. See Witherbee Storage Battery Co.
Link & Hemrick, Inc., 555 W. 52nd St., New York, N. Y.
New Jersey Storage Battery Co., 656 Summit Ave., Union City, N. J.
Universal Battery Co., 3410 S. La Salle, Chicago, Ill.
Witherbee Storage Battery Co., 75 Columbus Ave., New York.

PLATING GENERATORS
American Giant. See Connecticut Dynamo Motor Co.
Bogue Elec. Co., Chas. J., 132 King, New York, N. Y.
Burke Elec. Co., Erie, Pa.
Century Electric Co., 1806 Pine, St. Louis, Mo.
Danielsson Elec. Co., St. Louis, Mo.
Columbia Elec. Mfg. Co., 1292 E. 53rd, Cleveland, Ohio
Connecticut Dynamox Motor Co., Irvington, N. J.
Conpro. See Eager Elec. Co.
Eager Electric Co., 522 Newell, Watertown, N. Y.
Eclipse. See Fidelity Elec. Co.
Electric Specialty Co., 229 South, Stamford, Conn.
Esco. See Electric Speciality Co.
Fidelity Elec. Co., Lancaster, Pa.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Hobart Bros. Co., Troy, O.
Holtzer-Cabot Elec. Co., 125 Amory, Boston, Mass.
Ideal Electric & Mfg. Co., East Third St., Mansfield, O.
Jantz & Leist Elec. Co., Cincinnati, O.
Kendrick & Davis Co., Lebanon, N. H.
L'Hommedieu & Sons Co., Chas. F., 4521 Ogden Ave., Chicago, Ill.
Optimus. See Hanson-Van Winkle & Munning Co.
Reliance. See L'Hommedieu & Sons Co., Chas. F
Roth Bros. & Co., Div. of Century Electric Co., 1400 W Adams, Chicago, Ill.
Westinghouse Elec. Mfg. Co., East Pittsburgh, Pa.

PLATING AND FINISHING
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Amaloy. See American Machine & Foundry Co.
American Machine & Foundry Co., 5520 Second Ave., Brooklyn, N. Y.
Atlantic Chemical Co., Colt, Irvington, N. J.
Chromalite. See Metals Protection Corp.
Diamond Chrome. See U. S. Chromium Corp.
Duro Chrome. See General Chromium Corp.
General Chromium Corp., 3220 Bellevue Ave., Detroit, Mich. (Chromium Plate.)
Ideal Plating & Polishing Co., 55 Branford, Newark, N. J.
Metals Coating Co. of America, 495 N. Third, Philadelphia.
Metals Protection Corp., 401 Michigan, Indianapolis, Ind.
Parker Rust-Proof Co., 2177 E. Milwaukee, Detroit, Mich.
Rochester Elec. Products Corp., 89 Allen, Rochester, N. Y.
United Chromium, Inc., 51 E. 42d, New York, N. Y.
Oldylite Process Co., 3220 Bellevue Ave., Detroit, Mich. (Rust-Proof Finish.)
U. S. Chromium Corp., Wilkinsburg Sta., Pittsburgh, Pa.

PLATINUM,
Sheet, Rod, Tubing, Wire.
American Platinum Wks., 241 New Jersey Railroad Ave., Newark, N. J.
Baker & Co., Inc., 54 Austin, Newark, N. J.
Coffin Mfg. Co., B. F., 30 Court, Newark, N. J.
Interstate Products Corp., 29 Commercial, Newark, N. J
Wilco. See H. A. Wilson Co.
Wildberg Bros., Smelting & Refining Co., 742 Market San Francisco, Cal.
Wilson Co., H. A., Newark, N. J.

PLUG FUSES. See Fuses and Fuse Wire.
PLUG RECEPTACLES. See Receptacles, Plug.
PLUGS, Flashing. See Flashers, Sign.
PLUGS, Radio. See Radio Receiver Parts.

PLUGS, Attachment
A-1 Bakelite. See Connecticut Elec. Mfg. Co.
Ajax Elec. Specialty Co., 1956 Chestnut, St. Louis, Mo.
Alcor Mfg. Co., 4605 W. Madison, Chicago.
Anselite Elec. Mfg. Co., New Haven, Conn.
Anylite Elec. Co., Fort Wayne, Ind.
Arrow Electric Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Arre-Grip. See Arrow Elec.
Beardsley & Wolcott Mfg. Co., Waterbury, Conn.
Beaver Mfg. Co., 625 N. Third, Newark, N. J.
Bee-Ell Elec. Mfg. Co., 79 Mercer, New York, N. Y.
Belden Mfg. Co., 2310 B. S. Western Ave., Chicago, Ill.
(Special Soft Rubber Plug Furnished with Belden Cords).
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Bryant Elec. Co., Bridgeport.
C. H. See Cutler-Hammer Mfg. Co.
Carling Tool & Machine Co., 32 Union Place, Hartford Conn.
Cemco. See Connecticut Elec. Mfg. Co.
Circle F Mfg. Co., Trenton, N. J.
Colts Patent Fire Arms Mfg. Co., Hartford, Conn.
Connecticut Elec. Mfg. Co., Bridgeport, Conn.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Deal Electric Co., 453 Broome, New York, N. Y.
Diamond, H. See Hart Mfg. Co.
Dreadnaught. See Cutler-Hammer Mfg. Co.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn, N. Y.
Eastman Mfg. Co., Manitowoc, Wis.
Edison Electric Appliance Co., 5618 W. Taylor, Chicago.
Electric Co., 94 Allyn, Hartford, Conn.
Ericson Mfg. Co., 3257 Bradford Rd., Cleveland, O

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Esler Elec. Mfg. Co., 802 S. Adams, Marion, Ind.
York, N. Y.
Fitzall. See Rodale Mfg. Co.
Gaynor Electric Co., Inc., Stratford, Conn.
GE-Flex. See General Electric Co.
General Electric Co., Bridgeport, Conn. (Special Soft Rubber Plug furnished with G. E. Cords.)
Globe Metal Mfg. Co., 2122 E. Hazzard, Philadelphia, Pa.
Gold Seal Elecl. Co. of Ohio, Inc., 250 Park Ave., New
Gripall. See Beaver Mfg. Co.
Handle Cap. See Beaver Mfg. Co.
Hart Mfg. Co., Hartford, Conn.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co. Hartford, Conn.
Heetach. See Marks Products Co.
Hemco. See Bryant Electric Co.
Hoosick Falls Radio & Electrical Parts Mfg. Co., Hoosick Falls, N. Y.
H. & H. See Hart & Hegeman.
Hubbell, Inc., Harvey, Bridgeport, Conn.
Iffy. See Esler Elec. Mfg. Co.
Kool Plug. See Colt's Patent Fire Arms Mfg. Co.
Leviton Mfg. Co., 226 Newell, Brooklyn, N. Y.
Marks Products Co., 23 E. 16th, New York.
Metropolitan Electric Mfg. Co., Blvd. at 14th St., Long Island City, N. Y.
Nelco. See Nelson Elec. Co.
Nelson Elec. Co., Plant City, Fla.
P. & S. See Pass & Seymour.
Paragon Elec. Sales Co., 215 S. Fifth, Philadelphia, Pa
Pass & Seymour, Solvay Sta., Syracuse, N. Y.
Quartap. See Connecticut Elec. Mfg. Co.
Poloron Elec. Mfg. Co., 20 Bond, New York, N. Y.
Propp Co., M., 534 Broadway, New York.
Quick Catch. See Hubbell, Inc., Harvey.
Real. See Smith & Co., T. C.
Real Diamond. See Smith & Co., T. C.
Reben Electric Mfg. Co., 2024 Gravesend Ave., Brooklyn, N. Y.
Remco. See Reben Elec. Mfg. Co.
Reynolds Spring Co., Jackson, Mich.
Reynolite Masterpiece. See Reynolds Spring Co.
Ripple. See Bryant Elec. Co.
Rodale Mfg. Co., 200 Hudson, New York.
Safegard Elec. Appliance Co., 133 S. Twelfth, Philadelphia.
Samson Cutlery Co., 8 Jones, Rochester, N. Y.
Sears, Henry D., 80 Boylston, Boston 11, Mass.
Smith & Co., T. C., 3915 Powelton Ave., Philadelphia, Pa.
Snapit. See Marks Products Co.
Snoco. See Snow & Co., E. W.
Snow & Co., E. W., Rochester, N. Y.
Spartanette. See Bryant Elec. Co.
Spar Tap. See Bryant Elec. Co.
Speedway Elec. Mfg. Co., 30 Church, New York, N. Y.
Standard. See Cutler-Hammer Mfg. Co.
Suitzall. See Beaver Mfg. Co.
Surefit. See Alcor Mfg. Co.
T. E. C. See Electric Co.
Tedco. See Paragon Elec. Sales Co.
Telltale Tap. See General Elec. Co.
Templus. See Bryant Elec. Co.
Torrid. See Beardsley & Wolcott Mfg. Co.
Trio-Tap. See Rodale Mfg. Co.
Triple Tap. See General Elec. Co.
Twin Tap. See General Elec. Co.
United States Elec. Mfg. Co., 222 W. 14th, New York.
Un-X-Ld. See Speedway Elec'l Mfg. Co.
Utile Mfg. Co., 820 E. Liberty, Lancaster, Pa.
Weber. See Sears, Henry D.
Wellmade Elec. Mfg. Co., Torrington, Conn.
Wilshires. See Iona Co.
Yankee. See Beaver Mfg. Co.
POCKET METERS. See Instruments, Pocket.

POINTS, Contact
American Platinum Wks., 241 New Jersey Railroad Ave., Newark, N. J.
Baker & Co., Inc., 54 Austin, Newark, N. J. (Gold, Platinum, Silver.)
Coffin Mfg. Co., B. F., 30 Court, Newark, N. J. (Platinum and Silver.)
Cohn, Sigmund, 44 Gold, New York, N. Y. (Platinum.)
Elkon, Inc. (Div. of P. R. Mallory Co.), 350 Madison Ave., New York, N. Y.
Fansteel Products Co., North Chicago, Ill.
General Plate Co., Attleboro, Mass.
Hardy Metal Corp., Seattle, Wash.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Independent Contact Mfg. Co., 545 39th, Union City, N. J. (Tungsten.)
Interstate Products Corp., 29 Commercial, Newark N. J. (Platinum and Silver.)
National Contact Co., 33 W. 60th, New York. (Platinum.)
Nilhoff & Co., C. R., 230 W. Superior, Chicago. (Platinum.)
Spark-O-Metal. See Hardy Metal Corp.
Wilco. See Wilson Co., H. A.
Wilson Co., H. A., Newark, N. J. (Platinum and Silver.)

POLARITY INDICATORS. See Instruments, Pocket.
POLISHING MACHINES, WIRE. See Wire Polishing Machines.

PORCELAIN
Bushings. See Bushings, Box & Cabinet.
Liquid. See Cement, Liquid Porcelain.
Molding Machine. See Presses, Porcelain Molding.
Reflectors (Enameled). See Reflectors, Porcelain Enameled.
Refractory. See Cores, Resistance Coil.

PORCELAIN, Special Shapes
Akron Porcelain Co., Akron, Ohio.
American Porcelain Co., E. Liverpool, O
A. P. See Akron Porcelain Co.
Burgess & Co., East Liverpool, O
Central Porcelain Co., Columbiana, O
Circle F Mfg. Co., Trenton, N. J

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Corns China Co., Wellsville, O.
Crowley & Co., Henry L., 545 N. Arlington Ave., East Orange, N. J.
Electrical Refractories Co., East Palestine, O.
Globe Porcelain Co., Mulberry St. and St. Joes Ave., Trenton, N. J.
Hartford Faience Co., Hartford, Conn.
Hub-Way Mfg. Co., Hubbard, Ohio.
Illinois Electric Porcelain Co., Macomb, Ill.
Imperial Porcelain Wks., Canal and Mulberry, Trenton, N. J.
Knox Porcelain Corp., Knoxville, Tenn.
Louthan Mfg. Co., East Liverpool, O.
Mercer Porcelain Co., Trenton, N. J.
Metsch Refractories Co., East Liverpool, Ohio.
National Porcelain Co., Trenton, N. J.
New Jersey Porcelain Co., Trenton, N. J.
Nu Blue. See Star Porcelain Co.
Pass & Seymour, Inc., Solvay Sta., Syracuse, N. Y.
Porcelava. See Burgess & Co.
Porcelain Products, Inc., Findlay, Ohio.
Square D Company, Detroit, Mich.
Standard & Specialty Porcelain Co., Sun Prairie, Wis.
Star Porcelain Co., Muirhead St., Trenton, N. J.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.
Thomas & Sons Co., R., Lisbon, O.
Trenle Porcelain Co., East Liverpool, Ohio.
Union Elec'l Porcelain Wks., Inc., Trenton, N. J.
Washington Porcelain Co., Washington, N. J.

POROUS CUPS

Unglazed earthenware cups for primary (wet) batteries
Colonial Insulator Co., Akron, Ohio.
Maddocks Sons, John, Trenton, N. J.
Ohio Pottery Co., Zanesville, Ohio.
Robinson Clay Products Co., Akron, Ohio.

POSTS, Binding

Binding Posts, Switch Parts, Stop Points, Contacts, Arms, Levers. See also Radio Mountings.
American Radio Hardware Co., 135 Grand, New York.
Bunnell & Co., J. H., 32 Park Pl., New York, N. Y.
Chapman Machine Co., Terryville, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
DeJur-Amsco Corp., 418 Broome, New York, N. Y.
Eby Mfg. Co., Inc., H. H., 4710 Stenton Ave., Philadelphia, Pa.
Ensign. See Eby Mfg. Co., H. H.
Eureka. See Frank W. Morse Co.
Grammes & Sons, Inc., L. F., Allentown, Pa.
Gray Bros., Piano, Ill.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Hoosick Falls Radio & Electrical Parts Mfg. Co., Hoosick Falls, N. Y.
King. See Morse Co., Frank W.
Morse Co., Frank W., 289 Congress, Boston. (Spring Grip.)
Nutmeg. See Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co.
Polk, J. L., 41 Bell Ave., Troy, N. Y.
Premier Elec. Co., 3800 Ravenswood Ave., Chicago, Ill.
Quality. See H. H. Eby Mfg. Co.
Queen. See Morse Co., Frank W.
Thomaston Mfg. Co., Thomaston, Conn.
Waterbury Button & Moulding Co., Waterbury, Conn.

POTENTIOMETERS (Instruments). See Instruments, Laboratory Standard.
POTENTIOMETERS (Radio Control). See Radio Receiver Parts.
POWDERED CARBON. See Carbon, Powdered.
POWER TRANSMISSION CHAIN. See Chain, Power Transmission.
PRESS BOARD. See Cloth and Paper.

PRESSES, Armature Coil

Comstock Mfg. Co., Wilkes-Barre, Pa.
PRESSES, ARMATURE NOTCHING. See Notching Machines, Armature.

PRESSES, Molded Insulation

Burroughs Co., 246 N. Tenth, Newark, N. J.
Dunning & Boschert Press Co., 329 W. Water, Syracuse
Elmes Engrg. Works, Chas. F., 230 N. Morgan, Chicago.
Evans Engrg. Works, Chas. E., 1002 Fulton, Chicago, Ill
Farquhar Co., A. B., York, Pa.
French Oil Mill Machinery Co., Piqua, O.
Southwark Fdy. & Mach. Co., 400 Washington Ave., Philadelphia, Pa.
Stokes Mach. Co., F. J., 5834 Tabor Rd. (Olney), Philadelphia, Pa.
Terkelson Machine Co., 326 A, Boston, Mass.
Watson-Stillman Co., 75 West St., New York, N. Y.
Wood & Co., R. D., Florence, N. J.

PRESSES, Porcelain Molding

Baird, Andrew, 2715 Newark, Detroit, Mich.

PRESSES, Punching and Bending

Bench Presses—Power Presses; for Punching & Stamping Sheet Metal.
Ams Machine Co., Max, 101 Park Ave., New York, N. Y.
Baird Machine Co., Bridgeport, Conn.
Bliss Co., E. W., 53rd St. & Second Ave., Brooklyn, N. Y.
Federal Press Co., Elkhart, Ind.
Ferracute Machine Co., Bridgeton, N. J.
Hyro Mfg. Co., 200 Varick, New York, N. Y.
Loshbough-Jordan Tool & Machine Co., Elkhart, Ind.
Niagara Machine & Tool Wks., 637 Northland, Buffalo.
Peck, Stow & Wilcox Co., Southington, Conn.

PRESSES, Stamping. See Presses, Punching & Bending.
Rockford Iron Works, 846 Ray, Rockford, Ill.
PRISMS, Chandelier. See Crystals, Chandelier.
PROJECTOR LENSES. See Lenses.

PULLERS, Armature Shaft

Motor Pulley, Shaft & Pinion Pullers & Extractors.
Allen Electric & Equipment Co., Kalamazoo, Mich.
Big Buster. See Premier Elec. Co.
Crane Puller Co., Waltham, Mass.
Columbia Machine Works & Malleable Iron Co., Atlantic Ave. & Chestnut St., Brooklyn, N. Y.
Duff Mfg. Company, Pittsburgh, Pa.
Electric Service Supplies Co., 17th & Cambria Sts Philadelphia, Pa.
Little Giant. See Premier Elec. Co.
Peerless. See Electric Service Supplies Co.
Premier Electric Co., 3800 Ravenswood Ave., Chicago, Ill.
Weidenhoff, Joseph, 4352 Roosevelt Rd., Chicago, Ill

PULLEYS, Composition

General Electric Co., Schenectady, N. Y.
Rockwood Mfg. Co., Indianapolis, Ind.
Sprucolite Co., Bloomfield, N. J.

PUMPS, Oil Burner

Janette Mfg. Co., 556 W. Monroe, Chicago, Ill.
Milwaukee Tank Wks., Milwaukee, Wis.
Monroe Machine Tool Co., 737 W. Jackson Blvd., Chicago
Reflex. See Simplex Oil Heating Co.
Simplex Oil Heating Co., 1199 Eddy, Providence, R. I.
Teesdale Mfg. Co., 427 Market, Grand Rapids, Mich.

PUMPS, Vacuum

To Exhaust Incandescent Lamps.
Beach-Russ Co., 50 Church, New York, N. Y.

Bishop & Babcock Sales Co., 4901 Hamilton Ave., N. E., Cleveland, O.
Cenco. See Central Scientific Co.
Central Scientific Co., 460 E. Ohio, Chicago, Ill.
Dunham Co., C. A., 450 East Ohio, Chicago, Ill.
Elmer & Amend, 205 3rd Ave., New York, N. Y.
Elsler Elec. Corp., 756 S. 13th, Newark, N. J.
General Electric Co., Schenectady, N. Y.
Hubbard's Sons, Norman, 1 Carlton Ave., Brooklyn, N. Y.
Leiman Bros., 23 Walker, New York, N. Y.
Megavac. See Central Scientific Co.
Packard. See Hubbard's Sons, Norman.

PUNCHING PRESSES. See Presses, Punching.

PUNCHING and BENDING, Sheet Steel

Anderson Mfg. Co., Albert & J. M., 289 A, Boston, Mass.

RACKS, Wire Reel

(With Tension Device Attached).
Armature Coil Equipment Co., 2415 Forestdale Ave., Cleveland, Ohio.
Browning. See Mutual Foundry & Machine Co.
Chapman. Elec'l Wks., P. E., 1825 Cheuteau Ave., St. Louis, Mo. (Tensionless Dereeler).
Columbia Machine Tool Works & Malleable Iron Co., Atlantic Ave. and Chestnut St., Brooklyn, N. Y.
Comstock Mfg. Co., Wilkes-Barre, Pa.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
General Elec. Co., Schenectady, N. Y. (Tension Indicator.)
Mutual Foundry & Machine Co., Atlanta, Georgia.
Segur. See Electric Service Supplies Co.

RADIO CIRCUIT COMPONENTS

This heading includes Inductances (Coils), Capacitors (Condensers), Fixed Resistances, Grid Leaks, Transformers, Choke Coils, and Filters, also Amplifier Units and Kits.
Acme Appar. Corp., 39 Osborne, Cambridge, Mass.
Acme Products Co., Boston, Mass.
Acme Wire Co., New Haven, Conn.
Aero-Call. See Aero Products, Inc.
Aerovox Wireless Corp., 80 Washington, Brooklyn, N. Y.
Aero Products, Inc., 4611 Ravenswood Ave., Chicago, Ill.
Air-King Products Co., 216 Wallabout, Brooklyn, N. Y.
Ajax Elec. Specialty Co., St. Louis, Mo.
Akra-Ohm. See Shallcross Mfg. Co.
Alden Mfg. Co., Springfield, Mass.
All-American Mohawk Corp., 4201 Belmont Ave., Chicago.
Allen-Bradley Co., 494 Reed, Milwaukee, Wis.
Amerchoke. See American Transformer Co.
American Apparatus Co., Richmond, Ind.
American Specialty Mfg. Co., 165 Holland Ave., Bridgeport, Conn.
American Transformer Co., Newark, N. J
Amperite Rheostat. See Radiall Co.
Areo Elec'l Corp., 211 E. Columbia, Fort Wayne, Ind.
Arctic. See Premier Elec. Co.
Art Dial. See Pilot Radio & Tube Corp.
Audioformer Transformer. See Pacent Electric Co.
Autoformer. See Thordarson Elec. Mfg. Co.
Automatic Oil Heat Co., 9294 E. Fourth, St. Paul, Minn.
Automotive Parts Mfg. Co., 70 Washington St., Brooklyn.
B-Conomizer. See Pilot Radio & Tube Corp.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Bonine. See Turn-it Radio Sales.
Branston Co., Chas. A., 297 Washington, Buffalo, N. Y.
Brooklyn Metal Stamping Corp., 718 Atlantic Ave., Brooklyn, N. Y.
Browning-Drake Corp., Calvary, Waltham, Mass.
Buffer. See Aerovox Wireless Corp.
Buffalo. See De Jur-Amsco Corp.
Camfield. See Columbia Metal Products Co.
Campbell Electric Mfg. Co., 15 Stewart, Lynn, Mass.
Capacigrad. See Pilot Radio & Tube Corp.
Cardwell Mfg. Corp., Allen D., 81 Prospect, Brooklyn, N. Y.
Carter Mfg. Co., 6300 Euclid Blvd., East Cleveland, O.
Carter Radio Co., 407 S. Aberdeen, Chicago, Ill.
Central Radio Corp., Beloit, Wis.
Centraline. See Pilot Radio & Tube Corp.
Certified Condenser. See Radio Condenser Co.
Chelten Elec. Co., 4859 Stenton Ave., Philadelphia, Pa.
Clarostat Mfg. Co., 281 N. Sixth, Brooklyn, N. Y. (Radio Resistance.)
Cole Radio Mfg. Corp., 536 Bloomfield Ave., Bloomfield, N. J.
Columbia Metal Products Co., 360 E. Grand Ave., Chicago.
Concertone. See Chicago-Jefferson Fuse.
Connectoraids. See Alden Mfg. Co.
Continental Carbon, Inc., Cleveland, O.
Continental. See Gardiner & Hepburn, Inc.
Cornell Elec. & Mfg. Co., Anable & Rawson, Long Island City, N. Y.
Cresradio Corp., 166-32 Jamaica Ave., Jamaica, N. Y.
Crefot. See Premier Elec. Co.
Cub. See Cornell Electric & Mfg. Co.
Daven Co., 153 Summit, Newark, N. J. (Kits)
Davohm. See Daven Co.
DeForest Radio Co., Jersey City, N. J.
De Jur-Amsco Corp., 418 Broome, New York, N. Y.
Diamond Weave Coil. See Sickles Co., F. W.
Dongan Elec. Mfg. Co., 2985 Franklin, Detroit, Mich.
Dubilier Condenser Corp., 342 Madison av., New York.
Dumont Elec. Co., 40 W. 17th, New York, N. Y.
Duratran. See Dubilier Condenser Corp.
Durham & Co., 1936 Market, Philadelphia, Pa.
Dymac. See Electrical Products Mfg. Co.
Dynohmic. See Lynch, Inc.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn, N. Y.
Electrad, Inc., 173 Varick, New York, N. Y.
Electrical Products Mfg. Co., Providence, R. I. (Kit.)
Electrical Research Laboratories, 2500 Cottage Grove Ave., Chicago, Ill.
Electro Motive Engineering Corp., 127 W. 17th, New York.
Elkay. See Langbein Kaufman Radio Co.
Elkon, Inc., 350 Madison Ave., New York, N. Y.
El Menco. See Electro Motive Engineering Co.
Equamatic Kit. See Karas Elec. Co.
Equitrol. See Cardwell Mfg. Corp.
E-Z. See Polymet Mfg. Corp.
Faradon. See Wireless Specialty Apparatus Co.
Fast Co., John E., 3982 Barry Ave., Chicago, Ill.
Ferranti, Inc., 130 W. 42nd, New York, N. Y.
Filatrol. See De Jur-Amsco Corp.
Filterettes. See Tobe Deutschmann Co.
Filtrola. See All-American Mohawk Corp.
Flechtheim Co., A. M., 136 Liberty, New York, N. Y.
Ford Radio & Mica Corp., 113 Bleecker, New York, N. Y.
Frost, Inc., Herbert H., 1142 W. Beardsley, Elkhart, Ind.
Furnell Die Cast Condenser Corp., 16 Hudson, New York.
F. & H. Radio Laboratories, Fargo, N. D.
Gardiner & Hepburn, Inc., 611 Widener Bldg., Philadelphia, Pa.
General Instrument Corp., 225 Varick, New York, N. Y.
General Radio Co., 30 State, Cambridge, Mass.
General Transformer Corp., 910 W. Jackson Blvd., Chicago.

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General Winding Co., 214 Fulton, New York, N. Y.
Gen-Win. See General Winding Co.
Ger-Ait Radio Laboratories, 359 Flatbush Ave., Brooklyn, N. Y. (Adapter.)
Glastor. See Daven Co.
Globar Corp., Niagara Falls, N. Y.
Glo-Dial. See Wireless Radio Corp.
Gray & Danielson Mfg. Co., 260 1st, San Francisco, Cal.
Halldorsen Co., 4745 N. Western Ave., Chicago, Ill.
Hamilton-Sangamo Corp.
Hammarlund Mfg. Co., 424 W. 33rd, New York, N. Y.
Hardwick, Hindle, Inc., 122 Greenwich, New York, N. Y.
Harmonik. See Karas Elec. Co.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. (TRF Kits.)
Hedgehog Transformer. See Premier Elec. Co.
Heinemann Elec. Co., Trenton, N. J.
Held-Tite, Hi-ohm, Hi-pot. See Carter Radio Co.
Hi-Q Kit. See Hammarlund.
Hum-Dinger. See Clarostat Mfg. Co.
Hy-Wat. See Electro Motive Engineering Corp.
Igrad Condenser & Mfg. Co., 4322 Lake Ave., Rochester, N. Y.
Infra-Dyne. See Gray & Danielson Co.
International Resistance Co., 2006 Chestnut, Philadelphia, Pa.
Isograd, Isoleak. See Pilot Radio & Tube Corp.
Jefferson Electric Co., 1500 S. Laflin, Chicago, Ill.
J-M-P. Mfg. Co., 3329 Fond du Lac Ave., Milwaukee, Wis.
Karas Elec. Co., 4040 N. Rockwell, Chicago, Ill.
Kelford. See American Specialty Co.
Kenyon Transformer Co., 122 Cypress Ave., New York, N. Y.
Kilograd. See Pilot Radio & Tube Corp.
Krobiack. See Mountford, C. E.
Kuprox. See Kodel Radio Corp.
Langbein-Kaufman Radio Co., 42 Franklin, New Haven, Conn.
Lavite. See Aerovox Wireles Corp.
Lautz Mfg. Co., 245 N. J. R. R. Ave., Newark, N. J. (Radio Resistance).
Leakandenser. See Daven Co.
Lekeless. See Benjamin Elec. Mfg. Co.
Lemnis. See General Winding Co.
L. M. C. See Lautz Mfg. Co.
Loftin-White. See Hammarlund Mfg. Co.
Loless. See Wireless Radio Corp.
Lynch, Arthur H., 1775 Broadway, New York, N. Y.
Marco. See Martin-Copeland Co.
Martin-Copeland Co., 101 Sabin, Providence, R. I.
Maxitran. See Electrical Research Laboratories.
Mayolian Corp., 1665 Webster Ave., New York, N. Y. (Tone Filter.)
Meggit. See Cole Mfg. Corp.
Melco-Supreme. See De Jur-Amsco Corp.
Melcoupler. See Robertson-Davis Co.
Meloformer. See Robertson-Davis Co.
Metaleak. See Dubilier Condenser Corp.
Metrallgn. See General Instrument Corp.
Micadon Condenser. See Dubilier Condenser Corp.
Micamold Radio Corp., 1087 Flushing Ave., Brooklyn, N. Y. (Amplifier Kit.)
Mica-Static. See Dubilier Condenser Corp.
Micon Condenser. See Dubilier Condenser Corp.
Microcondenser. See Sterling Mfg. Co.
Microgrid. See Pilot Radio & Tube Corp.
Micrometric. See Karas Elec. Co.
Microstat. See Premier Elec. Co.
Midline. See Hammarlund Mfg. Co.
Modern Electric Mfg. Co., Toledo, O.
Mountford, C. E., 30 Sullivan, New York, N. Y.
Muter Co., Leslie F., 3440 S. Chicago Ave., Chicago, Ill. (Amplifier Kits.)
National Co., 61 Sherman St., Malden, Mass.
Neutro-Grad. See Pilot Radio & Tube Corp.
New York Coil Co., Mount Clare, Pa.
Nutmeg. See Hart & Hegeman Mfg. Co.
Ohio Carbon Co., 8215 Almira Ave., Cleveland, O.
Ohmite Mfg. Co., 643 N. Albany Ave., Chicago, Ill. (Resistance.)
One Way. See Carter Radio Co.
Orthometric. See Karas Elec. Co.
Orthophone. See De Jur-Amsco Corp.
Pacent Electric Co., 91 7th Ave., New York, N. Y.
Pam. See Samson Elec. Co.
Panatrol. See Wireless Radio Corp.
Perry Elec'l Resistor Corp., 289 New Main St., Yonkers, N. Y.
Phasatrol. See Electrad, Inc.
Philmore Mfg. Co., 106 7th Ave., New York, N. Y.
Piander. See De Jur-Amsco Corp.
Pierce Airo. See United Scientific Laboratories.
Pilot Radio & Tube Corp., 323 Berry, Brooklyn, N. Y.
Pilotran. See Pilot Radio & Tube Corp.
Potter Mfg. Co., North Chicago, Ill.
Polymet Mfg. Corp., 829 E. 134th St., New York, N. Y.
Power Box. See Scott Sales Co.
Powerohm. See International Resistance Co.
Powrad, Inc., 121 Ingraham, Brooklyn, N. Y.
Precision Coil Co., 122 Greenwich, New York, N. Y.
Precise Mfg. Corp., 254 Mill, Rochester, N. Y.
Premier Elec. Co., 3800 Ravenswood Ave., Chicago, Ill
Protectoraid. See Alden Mfg. Co.
Pyrohm. See Aerovox Wireless Corp.
Radiall Co., 50 Franklin, New York, N. Y.
Radio Appliance Corp., Springfield, Mass.
Radio Condenser Co., Thorn & Copewood, Camden, N. J.
Radio Engrg. Laboratories, 100 Wilbur Ave., Long Island City, N. Y. (Short Wave Kit.)
Radiolce Switch. See Cutler-Hammer Mfg. Co.
Radio Receptor Co., 106 7th Ave., New York.
Radiostat. See Allen-Bradley Co.
Raola. See Modern Elec. Mfg. Co.
Rauland-Lyric. See All American Mohawk Corp.
Receptrad. See Radio Receptor Co.
Reesonator. See F. & H. Radio Laboratories.
Regal. See American Specialty Mfg. Co.
Reliable Parts Mfg. Co., Wellington, O.
Remler. See Gray & Danielson Co.
Resistaformer. See Aerovox Wireless Corp.
Resistograd. See Pilot Radio & Tube Corp.
Rittenhouse Co., A. E., Honeoye Falls, N. Y. (Sole Selling Agent), Hatheway & Co., 16 Hudson, New York, N. Y.
Roberts Condenser. See Hammarlund Mfg. Co.
Robertson-Davis Co., 412 Orleans, Chicago, Ill.
Samson Elec. Co., Canton, Mass. (TRF Kits.)
Scovill Mfg. Co., 99 Waterbury, Conn.
Senior. See All American Mohawk Corp.
Sensory. See Heinemann Electric Co.
Sevison Magneto Engr. Co., 397 Phillips, Toledo, O.
Shallcross Mfg. Co., 700 Parker Ave., Collingdale, Pa.
Sickles Co., F. W., 130 Union, Springfield, Mass.
Signal Elec. Mfg. Co., Menominee, Mich.
Silver-Marshall, Inc., 6401 W. 65th St., Chicago. (Amplifier Kits.)
Silvertone. See Radio Receptor Co.
S. L. S. See Wireless Radio Corp.
S. L. T. See General Instrument Corp.
Somersolo. See DeForest Radio Co.
Splitmeter. See Premier Electric Co.
Sprague Specialties Co., Dept. M., Quincy, Mass.
Standard Transformer Co., Warren, O.
Sta-Put. See Martin-Copeland Co.
Sterling Mfg. Co., 2831 Prospect Ave., Cleveland, O.
Stromberg-Carlson Tel. Mfg. Co., 1060 University Ave. Rochester, N. Y.
Submariner. See J-M-P Mfg. Co.
Super Multiformer. See Precise Mfg. Corp.
Supertran Transformer. See Ford Radio & Mica Co.

STAND-BY,* *n. One who, or that which stands by one in need; something upon which one relies for constant use.*
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"WILL we have it fixed pretty soon, Grand-Daddy?" You bet! For Grand-Daddy was a good "fixer," a good old scout—who was always eager to mend the broken toys, tell stories, and do most anything he could, to please a little boy. Grand-Daddy was one of the good old stand-bys of our childhood.

The heating-appliance manufacturer has also had an old *stand-by in *Chromel*, for the past 23 years. In fact, the discovery of *Chromel* in 1906 created the heating device industry, by giving it the first heating element that would last. Since then, science has discovered no substitute for the Nickel-Chromium alloys, of which *Chromel* is the original.

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NEW YORK CHICAGO CLEVELAND BOSTON SAN FRANCISCO

Canadian Representative: Hiram Walker & Sons Metal Products, Ltd., Walkerville, Ontario

Hoskins Chromel

THE WIRE THAT MADE ELECTRIC HEAT POSSIBLE

RADIO CIRCUIT COMPONENTS—Continued
Symphony. See Modern Elec. Mfg. Co.
Syncrodenser. See Precise Mfg. Corp.
Telemonic Coil. See Condenser Corp. of America.
Telos Coil. See Condenser Corp. of America.
Thomas Engineering & Mfg. Co., 616 S. Michigan Ave., Chicago, Ill.
Thompson-Levering Co., 351 N. 57th, Philadelphia, Pa.
Thordarson Elec. Mfg. Co., Huron & Kingsbury Sts., Chicago
Tobe Deutschman Co., Canton, Mass.
Tone Control. See Sprague Specialties Co.
Toroid. See All American Mohawk Corp.
Transcontinental Coil Co., 5 Kirk Place, Newark, N. J.
Transcript-Clapp Kit. See Samson Electric Co.
Truphonic Amplification. See Alden Mfg. Co.
Tunadapta. See Lynch, Arthur H.
Tuway. See Carter Radio Co.
Twin-aud. See Peerless Radio Co.
Twin-Eight Transformers. See Bodine Electric Co.
Two-Ten & Two-Eleven. See Silver-Marshall.
Ultra Vario. See Brunc Radio Corp.
Univernier Condenser. See Auburn Button Works.
Universal Electro Chemical Corp., 30 W. 15th, New York
Universal Winding Co., Boston, Mass.
Valley Appliances, Inc., 634 Lexington Ave., Rochester, N. Y.
Variall Condenser. See Muter Co.
Volta. See Universal Electro Chemical Corp.
Volumgrad. See Pilot Radio & Tube Corp.
Walbert Radio Corp., 1000 Fullerton Ave., Chicago, Ill.
Waterbury Button & Moulding Co., Waterbury, Conn.
Wireless Radio Corp., Varick Ave. & Harrison Pl., Brooklyn, N. Y.
Wireless Specialty Apparatus Co. (J. P.), Boston, Mass
RADIO HARDWARE. See Radio Mountings.

RADIO MOUNTINGS

Coil Mountings, Coil Sliders and Rods, Switches, Detectors, Detector and Grid Leak Mountings, Panel Brackets, Special Radio Hardware & Trimmings, Metal Dials, Metal Panels, etc.

Aerovox Wireless Corp., 88 Washington, Brooklyn, N. Y.
Alden Mfg. Co., Brockton, Mass.
American Emblem Co., Utica, N. Y.
American Radio Hardware Co., 135 Grand, New York
Bonza. See Haydon & Haydon.
Carborundum Co., Niagara Falls, N. Y. (Detector.)
Chapman Machine Co., Terryville, Conn.
De Jur-Amsco Corp., 418 Broome, New York, N. Y.
Durham & Co., 1936 Market, Philadelphia, Pa.
Electrad, Inc., 173 Varick, New York, N. Y.
Etched Products Corp., 90 Tenth, Long Island City, N. Y (Metal Panels)
Eureka. See Morse Co Frank W.
General Etching & Mfg. Co., 3072 West Grand Ave., Chicago, Ill. (Metal Panels & Escutcheons.)
Globe Technolian Corp., Reading, Mass.
Glodial. See Wireless Radio Corp.
Hart & Hegeman Mfg. Co., Hartford, Conn.
Haydon & Haydon, 167 Chambers, New York, N. Y.
Master Engineering Co., 122 S. Michigan Ave., Chicago, Ill.
Morse Co., Frank W., 291 Congress, Boston, Mass.
Muter Co., Leslie F., 8440 S. Chicago Ave., Chicago.
Na-Ald. See Alden Mfg. Co.
Union Insulating Co., 296 Broadway, New York, N. Y.
Waddell Mfg. Co., Grand Rapids, Mich.
Wireless Radio Corp., Varick Ave. & Harrison Pl., Brooklyn.
Yaxley Mfg. Co., 9 S. Clinton, Chicago, Ill.

RADIO PANEL ENGRAVING. See Engraving, Radio Panel.

RADIO RECEIVER PARTS

Rheostats, Sockets, Plugs, Jacks.

Acme Elec. & Mfg. Co., 1652 Rockwell, Cleveland, Ohio.
Alden Mfg. Co., Springfield, Mass.
Allen-Bradley Co., 494 Reed, Milwaukee, Wis.
Amacostat. See American Apparatus Co.
American Apparatus Co., Richmond, Ind.
American Specialty Mfg. Co., 165 Holland Ave., Bridgeport Conn.
Automotive Equipment Co., 317 Halsey, Newark, N. J.
B. M. S. See Brooklyn Metal Stamping Corp.
Beaver Mfg. Co., 625 N. Third, Newark, N. J. (Multiple Plugs.)
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Brach Mfg. Corp., L. S., 120 Sussex Ave., Newark, N. J
Brooklyn Metal Stamping Corp., 718 Atlantic Ave., Brooklyn
Cabelug. See Jones, Howard B.
Carter Radio Co., 407 S. Aberdeen, Chicago, Ill. (Also Socket Adapters.)
Central Radio Laboratories, 14 Keefe Ave., Milwaukee
Centralab. See Central Radio Laboratories.
Clarostat Mfg. Co., 285 N. Sixth, Brooklyn, N. Y
Cle-Ra-Tone. See Benjamin Elec. Mfg. Co.
D. A Radio Co., 30 Hollister, Buffalo, N. Y
De Jur-Amsco Corp., 418 Broome, New York, N. Y.
De Veau See Stanley & Patterson
Dongan Elec. Mfg. Co., 2985 Franklin, Detroit, Mich
Duwtat. See De Jur-Amsco Corp.
E-Z. See Polymet Mfg. Corp.
Fby Mfg. Co., H. H., 4710 Stenton Ave., Philadelphia, Pa
Electrad, Inc., 173 Varick, New York, N. Y.
Electrical Products Mfg. Co., Providence, R. I
Fantail Plug. See Brooklyn Metal Stamping Corp
Frost, Herbert H., 1142 W. Beardsley, Elkhart, Ind
Gem-Jac. See Frost, Herbert H
General Instrument Corp., 225 Varick, New York, N Y
General Radio Co., 30 State, Cambridge, Mass.
Grav & Danielson Mfg. Co., 260 First, San Francisco, Cal
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Heinemann Elec. Co., Trenton, N. J.
Imp. See Carter Radio Co.
Jones, Howard B., 2300 Wabansia, Chicago. (Multiple Plug)
Klosner Radio Corp., 1022 E. 178th, New York, N. Y.
Martin-Copeland Co., 191 Sabin, Providence, R. I.
Microgrid. See Pilot Radio & Tube Corp.
Modu-Plug. See Central Radio Lab.
Morse Co., Frank W., 291 Congress, Boston, Mass.
Muter Co., Leslie F., 8440 S. Chicago Ave., Chicago.
Nutmeg. See Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co.
Pacent Elec. Co., 91 Seventh Ave., New York, N. Y.
Pan-Tab Jack. See Frost, Herbert H.
Philmore Mfg. Co., 106 Seventh Ave., New York, N Y
Pilot Radio & Tube Corp., 323 Berry, Brooklyn, N. Y.
Polymet Mfg. Corp., 599 E 134th St., New York, N. Y
Premier Elec. Co., 3800 Ravenswood Ave., Chicago, Ill.
Reeco Mfg Co., 23 W Third, Cincinnati, Ohio
Robertson-Davis Co., 361 W. Superior, Chicago, Ill.
Royalty See Electrad, Inc.
Samson Elec. Co., Canton, Mass.
Socostat. See D. A. Radio Co.
Stanley & Patterson, 150 Varick, New York, N Y
Sterling Mfg. Co., 2831 Prospect Ave., Cleveland, Ohio
Tubestat See Muter Co.
Wireless Radio Corp., Varick Ave. & Harrison Pl., Brooklyn
Workrite Radio Corp., 1838 E. 30th, Cleveland, O.
Yaxley Mfg. Co., 9 S. Clinton, Chicago, Ill

RADIO RECTIFIER TUBES

Armstrong Electric Co., 187 Sylvan Ave., Newark, N J
Arcturus Radio Tube Co., 260 Sherman Ave., Newark N J
Cable Radio Tube Corp., 80 N. Ninth, Brooklyn, N. Y.

Ceco Mfg. Co., 1200 Eddy, Providence, R. I.
Conneway Elec. Laboratories, 406 Jefferson, Hoboken, N. J
Cunningham, Inc., E. T., 370 Seventh Ave., New York, N. Y
Daven Co., 158 Summit, Newark, N. J.
DeForest Radio Co., Franklin St. & Central Ave., Jersey City, N. J.
Diamond Electric Co., Newark, N. J.
Diamond Vacuum Products Co., 4052 Diversey Ave., Chicago
Everready Raytheon. See National Carbon Co.
Gold Seal Electrical Co. of Ohio, Inc., 250 Park Ave., New York, N. Y.
Hygrade Lamp Co., Salem, Mass.
Jaeger Research Laboratories, 280 Park Ave., Weehawken, N. J
Ken-Rad Tube & Lamp Corp., Owensboro, Ky.
La Salle Radio Corp., Div. of Matchless Elec. Co., 1500 N. Ogden Ave., Chicago, Ill.
Manhattan Elecl. Supply Co., 510 Sixth Ave., New York.
National Carbon Co., New York, N. Y.
National Radio Mfg. Co., 1020 S. Central Park Ave., Chicago, Ill.
Neptron. See Hygrade Lamp Co.
Northern Mfg. Co., 367 Ogden, Newark, N. J.
Paramount Mfg. Co., 79 Orange, Newark, N. J.
Perryman Electric Co., 4901 Hudson Blvd., North Bergen, N. J.
Radio-Victor Corp. of America, 233 Broadway, New York.
Specialty Appliance Co., 6611 Euclid Ave., Cleveland, Ohio
Sylvania Products Co., Emporium, Pa.
Telemeter Corp., 533 Twelfth, West New York, N. J.
United Radio & Elec. Corp., 500 Chancellor Ave., Irvington N. J.

RADIO TRANSFORMERS. See Radio Circuit Components

RADIO TUBE BASE BRANDERS. See Engraving Radio Panel.

RADIO TUBE BASES. See Radio Molded Parts.

RADIO TUBE BULBS (Unfinished). See Bulbs, Glass

RADIO TUBE PARTS

Filament Hooks, Screens, Bolts & Nuts & Special Stampings.

Juno Fasteners, Inc., Hillside, N. J.
Newark Wire Cloth Co., 351 Verona Ave., Newark, N. J. (Screens).

RADIO WIRING HARNESS

Special wiring cable and harness assemblies for radio battery connections, radio tube adapter harness for converting battery operated receivers to A.C. operation; Socket Adapters for Power Tubes; Loud Speaker Extension Cords—This heading also includes auto ignition assemblies.

Afco. See American Fabric Co.
Ajax Elec. Specialty Co., 1926 Chestnut, St. Louis, Mo.
Alden Mfg. Co., Brockton, Mass. (Adapters.)
Alpbus. See Alpha Wire Corp.
Alpha Wire Corp., 520 Broadway, New York, N. Y.
Alpstrand. See Alpha Wire Corp.
American Braiding Co., Holyoke, Mass.
Belden Mfg. Co., 2310B S. Western Ave., Chicago, Ill.
Birnbach Radio Co., 254 W. 31st St., New York, N. Y.
Blue Ribbon. See Crescent Braid Co.
Brach Mfg. Co., L. S., Newark, N. J.
Connectoralds. See Alden Mfg. Co.
Cornish Wire Co., 30 Church, New York, N. Y.
Corwico. See Cornish Wire Co.
Crescent Braid Co., Providence, R. I.
Crescent Insulated Wire & Cable Co., Trenton, N. J.
De Luxe, 50 W. Houston, New York, N. Y.
Diamond Braiding Mills, Chicago Heights, Ill.
Echo. See Cornish Wire Co.
Enterprise Mfg. Co., Third & Dauphin Sts., Philadelphia, Pa. (Adapters)
Frost, Inc., Herbert H., 1142 W. Beardsley, Elkhart, Ind. (Adapters.)
Hatfield Rubber Wks., Inc., Hillside, N. J.
Lusterized. See American Braiding Co.
Manhattan Insulated Wire Co., 17 W. 60th St., New York.
Power, Inc., Harold J., Medford Hillside, Mass. (Adapters).
Radio Receptor Co., 106 Seventh Ave., New York, N. Y. (Adapters.)
Riga. See Birnbach Radio Co.
Sterling Mfg. Co., 2831 Prospect Ave., Cleveland, Ohio. (Adapters).
Wilkens Mfg. Co., 52 Orawaupum St., White Plains, N. Y.

RADIUM POWDER AND PAINT

Radium Dial Co., 3332 Forbes, Pittsburgh, Pa.
Undark. See United States Radium Corp.
United States Radium Corp., 535 Pearl, New York, N. Y.

RANGE SWITCHES, Rotary Snap. See Switches, Snap, Heavy Duty.

RAWHIDE GEARS. See Gears & Pinions, Rawhide.

READING LAMP BASES. See Bases, Reading Lamp.

REAMERS, Pipe. See Stocks, Dies and Reamers.

RECEPTACLES, Lamp. See Sockets and Receptacles.

RECEPTACLES, Plug, Heavy Duty

	KEY
Battery Charging	See B
Floor Boxes	See F
Welding	See W
Machine Tool	See W
Watertight, Marine, Mine	See M
Car Trailer Connection	See C
Extension	See E

A. B. C. See Anderson Mfg. Co.
Adam Electric Co., Frank, St. Louis, Mo. F
Adapti Co., 2896 E. 72nd, Cleveland, O.. F
Anderson Mfg. Co., Albert & J. M., 289 A. Boston, Mass. B W M C E
Appleton Elec. Co., 1763 Wellington Ave., Chicago, Ill. M
Arktite. See Crouse-Hinds Co.
Arnessen Electric Co., 13 Water, New York M
Arrow Electric Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.. F B W
Auth Electrical Specialty Co., 422 E. 53rd, New York, N. Y. E
Benjamin Elec. Mfg. Co., Des Plaines, Ill. F .. W M
Bryant Elec. Co., Bridgeport, Conn. (Also Range Type.) W
Campbell. See Steel City Elec. Co.
Cannon Elec. Development Co., 420 West Ave., 33, Los Angeles, Cal. F
C. E. M. Co. See Conn. Elec. Mfg. Co.
C. H. See Cutler-Hammer Mfg. Co.
Circle F Mfg. Co., Trenton, N. J. M

Gage List of
Electrical Buyers
The Trade Authority

Conduletto. See Crouse-Hinds Co.
Connecticut Elec. Mfg. Co., Bridgeport, Conn. F
Cory & Son, Chas., 183 Varick, New York M
Crouse-Hinds Co., Syracuse, N. Y. B W
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis. F
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa. C
Elwell Parker Elec. Co., 4232 St. Clair Ave., N. E., Cleveland, O. B
Fielding. See Stanley & Patterson.
Fountain's. See Jenkins Mfg. Co.
Fullman Mfg. Co., Latrobe, Pa. F
Fullman. See Steel City Elec. Co.
General Elec. Co., Merchandise Dept., Bridgeport, Conn. B
Gleason & Co., J. L., 241 Franklin, Boston, Mass. E
H. & H. See Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. B W
Hesse, Co., W. F., 76 Greenwich, New York, N. Y. W M E
Hubbell, Inc., Harvey, Bridgeport, Conn. (Also Range Type.) B W
Indestructible. See Kliegl Bros. Universal.
Jenkins Mfg. Co., Bloomfield, N. J. E
Kliegl Bros. Universal Elec. Stage Lighting Co., 321 W. 50th, New York, N. Y. F B W M
Latrobe. See Fullman Mfg. Co.
Lexington Electric Products Co., 12 Chapel, Newark, N. J. C
Loeffelholz & Co., Milwaukee, Wis. M
Major Equipment Co., 4603 Fullerton Ave., Chicago, Ill. M
Neco. See Novelty Elec. Co.
NePage McKenny Co., Seven Front, Seattle, Wash. F
Novelty Elec. Co., Tench & Cherry Sts., Philadelphia, Pa. C
Ohio Elec. & Controller Co., 5903 Maurice Ave., Cleveland, Ohio W
Ostrander Elecl. Works, W. R., 911 Atlantic Ave., Brooklyn, N. Y.
Preset. See Walker Bros. Co.
Pyle National Co., 1334 N. Kostner Ave., Chicago, Ill. W M C E
Quadrangle Mfg. Co., 32 S. Peoria, Chicago, Ill. (Combination wall bracket and convenience outlet.)
Ralco Mfg. Co., 123 N. Albany Ave., Chicago, Ill.
Russell & Stoll Co., 53 Rose, New York F B W M E
Square D. Co., Detroit, Mich. W
Stanley & Patterson, 150 Varick, New York, N. Y. F
Steel City Elec. Co., Pittsburgh, Pa.. F E
Thomas & Betts Co., 15 Park Place, New York, N. Y. F
V. V. Fittings Co., 711 Cherry, Philadelphia, Pa. M
Walker Bros., 12 E. 41st St., New York, N. Y. F E
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa. F B W M
Yale. See Electric Products Co.

RECORDERS, Elapsed Time. See Indicators, Operation.

REDUCERS, Socket. See Socket Reducers.

REFLECTOR LENSES. See Lenses.

REFLECTORS, Porcelain Enameled, Steel

ABolite Reflector Co., 7500 Sherman Ave., Cleveland, O
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Cello, Inc., 96 Prince, New York, N. Y.
Dunlap Co., John, Carnegie, Pa.
Durex. See Wheeler Reflector Co.
Federal Electric Co., 6700 S. State, Chicago, Ill.
Goodlites. See Goodrich Elec. Co.
Goodrich Elec. Co., 1650 Ogden Ave., Chicago, Ill.
Isolux. See Wheeler Reflector Co.
Ivanhoe Division of Miller Co., Cleveland.
Jumbo. See Quadrangle Mfg. Co.
Marbelite Art Products Co., 140 N. Robey, Chicago, Ill.
Monk, H. E., 18 Warren, New York, N. Y.
Mulz Elecl. Mfg. Co., 210 N. Ogden Ave., Chicago, Ill.
Oamcal. See Overbaugh & Ayers.
Overbaugh & Ayers, 411 S. Clinton, Chicago, Ill.
Para Steel. See Wheeler Reflector Co.
Perfection. See Tindall & White.
Philadelphia Elec'l & Mfg. Co., 1223 N. 31st, Philadelphia
Quad. See Quadrangle Mfg. Co.
Quadrangle Mfg. Co., 32 S. Peoria, Chicago, Ill.
Richardson Reflector Co., 16 Hudson, New York, N. Y.
Sturdor. See Benjamin Elec. Mfg. Co.
Tindall & White, 33 W. 60th, New York, N. Y.
Vaporlux. See Wheeler Reflector Co.
Westinghouse Elec. & Mfg. Co., South Bend, Ind.
Wheeler Reflector Co., 175 Congress, Boston, Mass.

REFRIGERANTS. See Chemicals, Refrigeration.

REFRIGERATION CHEMICALS. See Chemicals, Refrigeration.

REFRIGERATOR CABINETS

Airtite. See Rhinelander Refrigerator Co.
Alaska Refrigerator Co., Muskegon, Mich.
American Refrigerator Corp., Peru, Ind.
Arlington Refrigerator Co., Arlington, Vt.
Athermos. See Gurney Refrigerator Co.
Baldwin Refrigerator Co., Burlington, Vt.
Banta Refrigerator Co., Clearfield, Pa.
Belding-Hall Electrical Corp., Belding, Mich.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Bohn Refrigerator Co., St. Paul, Minn.
Cavalier. See Tennessee Furniture Co.
Challenge Refrigerator Co., Grand Haven, Mich.
Champion Refrigerator Co., 296 Lexington Ave., New York.
Crystal Refrigerator Co., Fremont, Neb.
Crystelaire. See Benjamin Elec. Mfg. Co.
Dry-Air. See Baldwin Refrigerator Co.
Dry-Cold. See Hill & Co.
Eddy & Sons Co., D., 236 Adams, Boston, Mass.
Erie Art Metal Co. & Erie Metal Furniture Co., Erie, Pa.
General Necessities Corp., General Necessities Bldg., Detroit, Mich.
Gibson Refrigerator Co., Greenville, Mich.
Gloekler Co., Bernard, 1627 Penn Ave., Pittsburgh, Pa.
Gurney Refrigerator Co., Fond du Lac, Wis.
Harder Refrigerator Corp., Cobleskill, N. Y.
Haskelite Mfg. Co., 120 S. La Salle, Chicago, Ill. (Knockdown.)
Heintz Mfg. Co., Front & Olney Aves., Philadelphia, Pa.
Heinz & Munschauer, Superior and Randall, Buffalo, N. Y.
Herrick Refrigerator Co., 1806 River, Waterloo, Iowa.
Hibbard Cabinets, Inc., 6504 Euclid Ave., Cleveland, O
Hill & Co., C. V., 360 Pennington Ave., Trenton, N. J.
Holderle Bros., Inc., 299 Exchange, Rochester, N. Y.
Howe Scale Co., Rutland, Vt.
Jewett Refrigerator Co., Buffalo, N. Y
Kingston. See Lorillard Refrigerator Co
Kleen Kold. See Harder Refrigerator Corp.

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A NEW INDUSTRY BY PIONEERS IN THE FIELD

Founded by GEO. A. JACOBS *and Associates*

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INCA

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FORT WAYNE, INDIANA

EASTERN OFFICE: NEWARK, NEW JERSEY—INDUSTRIAL OFFICE BLDG.

REFRIGERATOR CABINETS—Continued
Knox Products Co., Fourth & Greenhill Ave., Wilmington, Del.
Knox. See Erie Art Metal Co.
Leonard Refrigerator Co., Div. of Kelvinator Corp., Grand Rapids, Mich.
Liver & Co., C. B., Omaha, Neb.
Loeber Co., Henry G., 151 E. 126th, New York, N. Y. (Ice Cream Cabinet.)
Lorillard Refrigerator Co., 44 Cooper Square, New York.
Louisville Refrigerator Corp., 4460 Louisville Ave., Louisville, Ky.
Louisville Tin & Stove Co., Louisville, Ky.
Mace & Co., L. H., 55 E. 150th, New York, N. Y.
Maine Mfg. Co., Nashua, N. H.
McCray Refrigerator Sales Corp., 2864 Lake St., Kendallville, Ind.
Mowatt Refrigerator Co., 25 Oak Grove, San Francisco, Cal.
Omaha Fixture & Supply Co., 11th and Douglas, Omaha.
Oreole. See Ottenheimer Bros.
Ottenheimer Bros., Baltimore, Md.
Plymetl. See Haskelite Mfg. Co.
Reol. See Ottenheimer Bros.
Rexlite. See Ottenheimer Bros.
Rex Mfg. Co., Connersville, Ind.
Rexdale. See Rex Mfg. Co.
Rhinelander Refrigerator Co., Rhinelander, Wis.
Sanitary Refrigerator Co., Fond du Lac, Wis.
Schmidt Co., C., John and Livingston, Cincinnati, O.
Seeger Refrigerator Co., St. Paul, Minn.
Sherer-Gillett Co., 501 W. Washington, Chicago, Ill.
Steeprest. See Helntz Mfg. Co.
Success Mfg. Co., Gloucester, Mass.
Tennessee Furniture Co., Chattanooga, Tenn.
Vogt. See General Necessities Corp.
Ward Refrigerator Co., 6901 S. Alameda, Los Angeles, Cal.
White Mountain. See Maine Mfg. Co.
White Seal. See Louisville Refrigerator Co.

REFRIGERATOR CONDENSER UNITS. See Condenser Units, Refrigerator.

REFRIGERATOR FITTINGS

Commonwealth Brass Corp., 5781 Commonwealth Ave., Detroit, Mich.

REGULATORS, Temperature

American Radiator Co., 1807 Elmwood Ave., Buffalo, N. Y. (Mercury Switch Type.)
American Teletherm Co., 1017 Summit, Toledo, O.
American Thermostat Co., 226 Jelliff Ave., Newark, N. J.
Automatic Electric Heater Co., 1706 Race, Philadelphia, Pa. (Furnace.)
Automatic Reclosing Circuit Breaker Co., Columbus, O.
Basel Mfg. Co., 911 Muiberry, Kansas City, Mo.
Boston Machine Wks. Co., 7 Willow, Lynn, Mass.
Brown. See Electric Automatic Appliance Co.
Brown Instrument Co., Wayne & Windrim, Philadelphia.
Ceaco. See Cobb Electric Appliance Co.
Cobb Electric Appliance Co., 100 Massachusetts Ave., Boston.
Cunt Elec. Co., 2700 Southport Ave., Chicago, Ill.
Davis & Daggett Co., 238 Dwight, Springfield, Mass.
D. & T. Manufacturing Co., 3001 La Salle, St. Louis, Mo.
Electric Automatic Appliance Co., Denver, Col.
Engelhart, Chas., 90 Chestnut, Newark, N. J.
Fabrice Thermostatic Control Co., 4750 Sheridan Rd., Chicago, Ill.
Gifford Heat Control Systems, 1 Broadway, New York.
Gold Car Htg. & Ltg. Co., 220 36th, Brooklyn, N. Y.
Hart Mfg. Co., Hartford, Conn.
Hermansen Elecl. Co., 505 W. 41st, New York, N. Y.
Hynes & Cox Elec. Corp., 406 N. Pearl, Albany, N. Y.
Jewell Mfg. Co., Auburn, N. Y.
Johnson Service Co., 149 Michigan, Milwaukee, Wis.
Lockswitch. See Time-O-Stat Controls Co.
Majestic Electric Appliance Co., San Francisco, Cal.
Marvel. See American Thermostat Co.
Mercoid Corp., 564 W. Adams, Chicago, Ill. (Mercury Switch.)
Minneapolis-Honeywell Regulator Co., 2753 Fourth Ave., Minneapolis, Minn.
Penn Electric Switch Co., Des Moines, Iowa.
Penn Heat Control Corp., 1207 Race, Philadelphia, Pa.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Protectostat. See Minneapolis-Honeywell.
Quick Freeze. See Penn Electric Switch Co.
Ranco. See Automatic Reclosing Circuit Breaker Co.
Savutime Devices, Inc., 88 Manhattan, Rochester, N. Y.
Simplex Heat Regulator, 2938 Pillsbury Ave., Minneapolis.
Snapon. See Tagliabue Mfg. Co.
Souder-Kornsby Co., Tamaqua, Pa.
Sure Fire. See Boston Machine Wks.
Tagliabue Mfg. Co., C. J., 18 33rd, Brooklyn, N. Y.
Time-O-Stat Controls Co., Crambiet Engineering Div., 284 Milwaukee Ave., Milwaukee, Wis.
Trent Co., Harold E., 439 N. 12th, Philadelphia, Pa.
Webster Elec. Co., Racine, Wis.
White Mfg. Co., 2362 University Ave., St. Paul, Minn.
Wilcolator Co., Newark, N. J.
Wilson-Maulin Co., 383 Concord Ave., New York, N. Y.

REGULATORS, Voltage

Ward-Leonard Electric Co., Mount Vernon, N. Y.
Rotor. See Ward-Leonard Electric Co.

RELAYS

(See also Circuit Breakers and Thermostats.)
American Instrument Co., 774 Girard, N. W., Washington, D. C.
Automatic Switch Co., 154 Grand, New York, N. Y.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Burke Controller Co., 369 Lexington Ave., New York, N. Y.
Dunco. See Struthers Dunn, Inc.
General Electric Co., Schenectady, N. Y.
Leach Relay Co., 693 Mission, San Francisco, Cal.
Roller-Smith Co., 120 Broadway, New York, N. Y.
Signal Engineering & Mfg. Co., 146 W. 14th, New York
Struthers Dunn, Inc., 136 N. Juniper, Philadelphia, Pa.
Wilcolator Co., Newark, N. J.

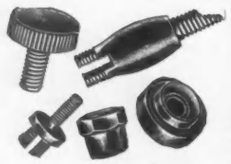
REMOTE CONTROL SWITCHES. See Switches, Remote Control.

REMOVERS, Coil

Ewing Mfg. Company, Middleport, Ohio.

RESISTANCE
Boxes. See Instruments, Laboratory Standard
Coil Cores. See Cores, Resistance.
Test Sets. See Instruments
Units, Radio. See Radio Circuit Components
Units. See Units, Rods & Grids.
Wire. See Wire Bare.

SCREW MACHINE PRODUCTS AND SPRINGS
for every purpose
WILLIAM STEINEN & COMPANY
297 Washington St. Newark, N. J.


Screw Machine Products
UP TO 2¼ in. DIAMETER
OLSON MFG. CO.
56 Commerical St.
WORCESTER, MASS.

RESISTORS

Hardwick, Hindle, Inc., 122 Greenwich, New York, N. Y.
RESISTORS. See Units, Rods & Grids.
RESURFACERS, Commutator. See Stones, Commutator, also Tools, Commutator Truing.
REVOLUTION COUNTERS. See Tachometers.
RHEOSTATS,
Motor-Controlling. See Controllers, also Rheostats.
Radio. See Radio Receiver Parts.
Sewing Machine. See Controllers.

RHEOSTATS

KEY

Battery Charging ..... See B
Stage Dimming ..... See D
Meter Testing (Laboratory) ..... See L
Plating Tank ..... See P
Motion Pictures (Projector Lamp) ..... See M
Motor Starting, Field and Speed Regulating. See F

	F	B	D	P	M	L
Allen-Bradley Co., 484 Reed, Milwaukee						L
Biddle, James G., 1211 Arch, Philadelphia						L
Brach Mfg. Corp., L. S., Newark, N. J. (Radio Battery Control.)		B				
Bradleystat. See Allen-Bradley Co.						
Columbia Electric Mfg. Co., 1292 E. 52nd, Cleveland, O.				P		
Controlite. See Ward Leonard Elec. Co.						
Crown Rheostat & Supply Co., 1908 Maypole Ave., West Chicago, Ill.				P		
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis.	F	B	D			L
Economic Rheostat Switch Co., 3551 N. 5th, Philadelphia, Pa.	F					
Electric Controller & Mfg. Co., 2700 E. 79th, Cleveland, O.	F					
Electric Products Co., 1725 Clarkstone Rd., Cleveland, O.		B				
General Electric Co., Schenectady, N. Y.	F					L
Hanson-Van Winkle-Munning Co., Matawan, N. J.				P		
Holzmuller, C. J., 1108 Howard, San Francisco, Cal.			D			
Kliegl Bros. Universal Elec. Stage Lighting Co., 321 W. 50th, New York, N. Y.			D		M	
Knoeller Elec. Co., De Pere, Wis.	F					
National Elec. Controller Co., 5315 Ravenswood Ave., Chicago	F	B	D		M	L
Optimus. See Hanson-Van Winkle-Munning Co.						
Robertson, Leo F., Inc., 532 W. 22nd, New York, N. Y.					M	
Rubicon Co., 29 W. Sixth, Philadelphia						L
schaefer Bros. Co., 1059 W. 11th, Chicago		B				
Simplicity. See Cutler-Hammer Mfg. Co.						
Union Elec. Mfg. Co., 634 Juneau Ave., Milwaukee, Wis.	F					
Universal. See Ward Leonard Elec. Co.						
Vitrohm. See Ward Leonard Elec. Co.						
Ward Leonard Elec. Co., 31 South, Mt. Vernon, N. Y.	F		D		M	
Watton. See Electric Products Co.						
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.	F				M	

RINGS Seal. See Packing.

RIVETS

Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh.
American Brass Co., Waterbury, Conn.
Blake & Johnson Co., 1497 Thomaston Ave., Waterville, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Chicago Rivet & Specialty Co., 1830 S. 54th, Chicago, Ill.
Hassall, Inc., John, 402 Oakland, Brooklyn, N. Y.
Hungerford Brass & Copper Co., Div. of The Chase Brass Companies, Inc., 88 Lafayette, New York, N. Y.
Manufacturers Belt Hook Co., 1315 W. Congress, Chicago, Ill.
Nelson Rivet Co., Taunton, Mass.
Stimpson Co., Edwin B., 70 Franklin Ave., Brooklyn, N. Y.
Thomson Mfg. Co., Judson L., Waltham, Mass.
Tubular Rivet & Stud Co., 87 Lincoln, Boston, Mass.
Waterbury Brass Goods Co., Waterbury, Conn.
Wright & Corson Mfg. Co., Bridgeport, Conn.

RODS, Resistance. See Units, Rods and Grids.
ROLLER BEARINGS. See Bearings, Ball and Roller.

ROLLS, Coil Flattening

Columbia Machine Tool Works & Malleable Iron Co., Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

RUBBER BELTS. See Belts, Rubber.

RUBBER, Hard

Hard Rubber, Ebonite, Vulcanite.
Aetna Rubber Co., 815 E. 79th, Cleveland, O.
American Hard Rubber Co., 11 Mercer, New York, N. Y.
Connecticut Hard Rubber Co., West Haven, Conn.
Goodrich Rubber Co., B. F., Akron, O.
Luzerne Rubber Co., Muirhead, near Dewey, Trenton, N. J.
Mahoganite. See American Hard Rubber Co.
New York Hard Rubber Turning Co., 212 Centre, New York.
Panelyte Corp., Trenton, N. J.
Radiolite. See Superior Hard Rubber Co.
Stokes Rubber Co., Trenton, N. J.
Superior Hard Rubber Co., Butler, N. J.
United States Rubber Co., 1790 Broadway, New York, N. Y.
Vulcanized Rubber Co., 251 4th Ave. New York, N. Y.
Vulco Panels. See Vulcanized Rubber Co.

RUBBER, MECHANICAL GOODS

Goodrich Rubber Co., B. F., Akron, O.
Manhattan Rubber Mfg. Co., Passaic, N. J.
Republic Rubber Co., Youngstown, O.
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Sun Rubber Co., Barberton, O.
Toyeraft Rubber Co., Dept. W., Ashland, O.

RUBBER, SEMI-HARD. See Rubber Mechanical Goods.

RUBBER, Sponge

Sun Rubber Co., Barberton, O.
Toyeraft Rubber Co., Dept. W., Ashland, O.

RUBBER TAPE. See Tape, Rubber and Friction.
RUBBER TUBING. See Tubing, Rubber.
RUST PROOFING. See Plating & Finishing.
SAL AMMONIAC. See Chemicals, Battery.
SALTS, Battery. See Chemicals, Battery.
SATURATING TANKS. See Wire Manufacturing Machines.
SCREW SHELLS, Socket. See Shells, Screw Socket.

SCREW DRIVING MACHINES

Vim Electric Tool Co., 149 Broadway, New York, N. Y.

SCREW MACHINE PRODUCTS

Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh, Pa.
American Metal Wks., 4385 Stanton Ave., Philadelphia, Pa.
Barnes Co., Wallace, Bristol, Conn.
Blake & Johnson Co., 1497 Thomaston Ave., Waterville, Conn.
Bridgeport Brass Co., 774 E. Main, Bridgeport, Conn.
Brighton Screw & Mfg. Co., 1456 Harrison Ave., Cincinnati, O.
Chapman Machine Co., Terryville, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Colonial-Premier Co., 225 W. Ohio, Chicago, Ill.
Continental-Diamond Fibre Co., Bridgeport, Pa.
Eureka Tool & Machine Co., Newark, N. J.
Farlin Mfg. Co., Decatur, Ill.
Hanson, Einar B., 17 Hermon, Worcester, Mass.
Hubbell, Inc., Harvey, Bridgeport, Conn.
Indianapolis Screw Products Co., 621 N. Noble, Indianapolis.
Interstate Products Corp., 29 Commercial, Newark, N. J.
Linden & Co., 891 Broad, Providence, R. I.
Meisel Press Mfg. Co., 944 Dorchester Ave., Boston, Mass.
Olsen Mfg. Co., 56 Commercial, Worcester, Mass.
Pheoli Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Plume & Atwood Mfg. Co., 474 Bank, Waterbury, Conn.
Progressive Mfg. Co., Torrington, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Shimer & Sons, Samuel J., Milton, Pa.
Steiner & Co., 297 Washington, Newark, N. J.
Thomaston Mfg. Co., Thomaston, Conn.
Waterbury Brass Goods Corp., Waterbury, Conn.
Wilmington Fibre Specialty Co., Wilmington, Del.

SCREWS, Cap (Cut Thread)

Bristol Co., Waterbury, Conn.
Hartford Machine Screw Co., Hartford, Conn.

SCREWS, Drive

Parker-Kalon Corp., 190 Varick, New York, N. Y.

SCREWS, Machine

Blake & Johnson Co., 1497 Thomaston Ave., Waterville, Conn.
Chicago Nut Mfg. Co., 2513 Cullerton, Chicago, Ill.
Clark Metal Products, Inc., 490 Hancock Ave., Bridgeport, Conn.
Elco Tool & Screw Corp., Rockford, Ill.
Hubbell, Inc., Harvey, Bridgeport, Conn.
New England Screw Co., Dept. A, 44 Farnsworth, Boston.
Pheoli Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Progressive Mfg. Co., Torrington, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Strong, Carlisle & Hammond, 1392 W. Third, Cleveland, O.

SCREWS, Machine (Cut Thread)

American Screw Co., Providence, R. I.

SECOHMMETERS. See Instruments, Laboratory Standard
SEGMENTS. See Discs, Armature.

SEPARATORS, Storage Battery

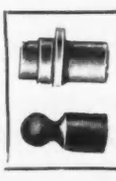
Campbell Elec. Co., Kansas City, Mo.
Carlile & Doughty, 2530 N. Broad, Philadelphia, Pa.
Chattanooga Battery Box Co., Chattanooga, Tenn.
Certified. See Ermet Products Co.
Ermet Products Co., Sherman Drive & 16th, Indianapolis, Ind. (Wood.)
Estes & Sons, E. B., 25 Vanderbilt Ave., New York. (Wood.)
Indianapolis Box & Separator Co., 1450 E. 19th St., Indianapolis, Ind. (Wood.)
Indianapolis Mfg. Co., Indianapolis, Ind.
Inseco. See Indianapolis Box & Separator Co.
Link & Heinrick, Inc., 555 W. 52nd, New York, N. Y.
Red Band. See Indianapolis Mfg. Co.
Stewart Mfg. Co., Wm. E., 14th & Elm, Flint, Mich. (Wood.)
Wick Lumber Co., R., 539 W. 52nd, New York. (Wood.)

SHADES

Aluminum. See Shades, Metallic.
Asbestos. See Shades, Fabric.
Bamboo. See Shades, Fabric.
Brass. See Shades, Metallic.
Cast Metal. See Shades and Domes.
Copper. See Shades Metallic.
Cretonne. See Shades, Fabric.
Leaded. See Shades and Domes.
Leather. See Shades, Fabric.
Linen. See Shades, Fabric.
Mica. See Shades, Mica.
Molded. See Molded Insulation.
Mosaic. See Shades and Domes.
Paper. See Shades, Fabric.
Parchment. See Shades, Fabric.
Silk. See Shades, Fabric.
Stamped Metal. See Shades, Metallic; also Shades and Domes.
Steel. See Shades, Metallic.
Tin. See Shades, Metallic.
Zinc. See Shades, Metallic.

SHADES, Fabric

Asbestos Cretonne, Leather, Linen, Paper, Silk, Bamboo Parchment.
Acme Lamp Shade Co., 630 West Jackson Blvd., Chicago. (Silk.)
Adelphi Lamp Shade Co., 242 Fifth Ave., New York. (Silk.)
Admiration Lamp Shade Co., 160 Madison Ave., New York, N. Y. (Silk.)
Andrews Co., C. M., 32 E. 30th, New York, N. Y. (Silk.)
Art Lamp Shade Studios, 316 Fifth Ave., New York, N. Y.
Audrey Art Shade Studios, 105 Thatford Ave., Brooklyn.
Block & Co., L. D., 37 E. 18th St., New York, N. Y.
Borghese. See Hall, Chas.
Daiger Co., Charles V., 76 Essex, Boston, Mass. (Silk.)
Eastern Art Shop, 14 W. 19th, New York. (Parchment.)
Foss Parchment Shade Studio, 1338 E. 12th, Oakland, Cal. (Parchment.)
Foslite. See Foss Parchment Shade Studio.
Frostelene. See Art Lamp Shade Studios.
Gibson Art Co., 223 W. Fourth, Cincinnati, Ohio. (Paper.)
Hall, Chas., 3 E. 40th, New York, N. Y. (Paper Parchment.)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Send us your specifications for an estimate.
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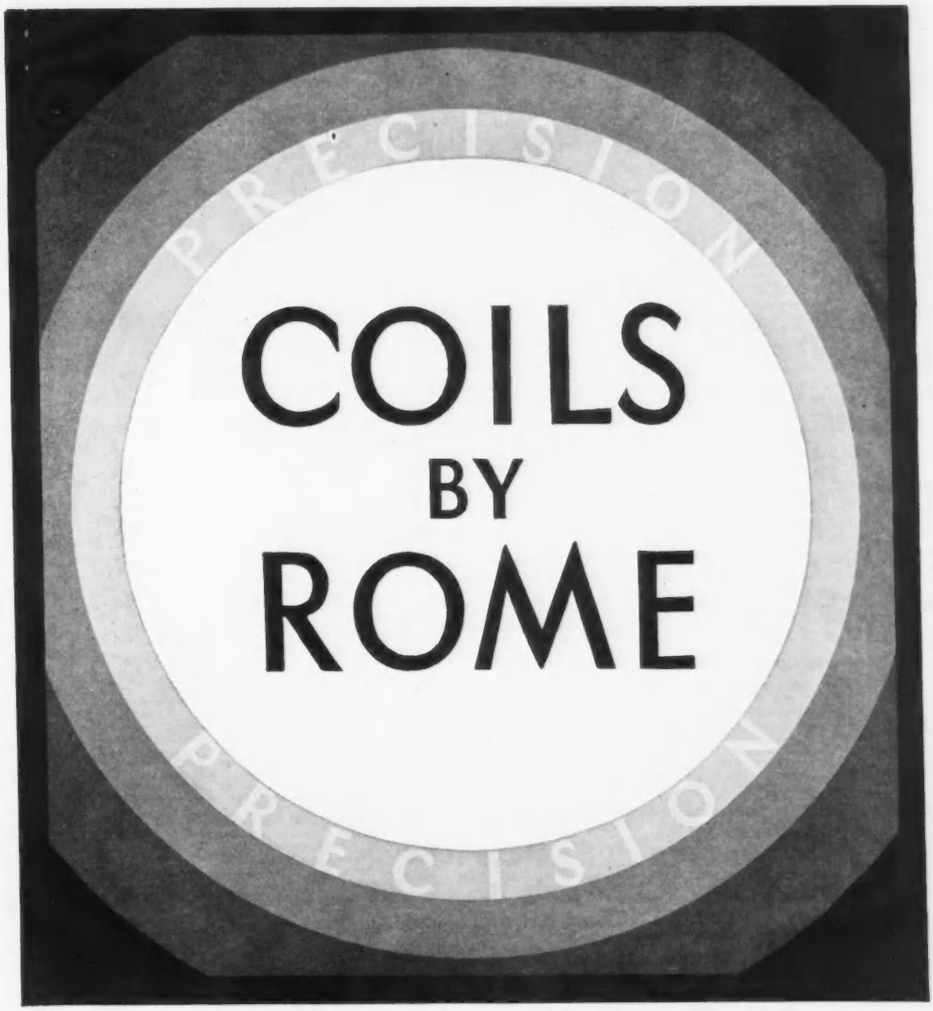
Providence, R. I.



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ROME WIRE COMPANY
Division of General Cable Corporation
ROME, NEW YORK

ROME PRECISION COILS

SHADES, Fabric—Continued
Hanson Co., Paul, 15 E. 26th, New York, N. Y. (Chints.)
Harris Mfg. Co., 122 University Place, New York, N. Y. (Parchment.)
Herco Art Mfg. Co., Meriden, Conn.
Hoft Studio, 46 W. 21st, New York, N. Y. (Parchment.)
Idealite Elec. Lamp Shade Mfg. Co., 7 E. 17th, New York, N. Y. (Parchment.)
Kapa Shell. See Wardwell, E. H.
Kerwin. See Hall, Chas.
Kno-Glair. See Hamilton, M. E.
Lamb Bros. & Greene Corp., Napannee, Ind. (Silk.)
Luxrite. See John H. St. John.
Maxwell-Ray Co., Milwaukee, Wis. (Silk.)
Monarch Lamp & Shade Co., 210 N. Second, Philadelphia Pa. (Silk.)
Morimura Bros., 58 W. 23rd, New York. (Bamboo, Silk. Cretonne.)
Parchment Novelty Co., 87 E. 10th, New York, N. Y (Parchment.)
Patent Lamp Shade Co., 1361 Frankford Ave., Philadelphia
Peerless Lamp Shade Mfg. Co., 114 E. 25th, N. Y. (Silk.
R. D. Electric Co., Fort Wayne, Ind. (Linen and Silk.)
Reuter, Wm., 32 W. 34th, New York, N. Y. (Silk.)
Rindsberger Mfg. Corp., 18 E. 24th, Chicago, Ill.
Rosita Studio, 10 W. 28th, New York, N. Y. (Parchment and Leatherette.)
Sanderson's Art Co., Milwaukee, Wis. (Parchment.)
Springel & Son, A., 26 S. 3rd, Philadelphia, Pa.
St. John, John H., 1298 Atlantic Ave., Brooklyn, N. Y. (Silk.)
Straus-Hohenstein Co., 133 W. 21st, New York. (Silk.)
Superior Lamp Shade Manufacturers, 72 Madison Ave., New York, N. Y. (Silk.)
Tombs Studios, Wm. H., 172 Pennsylvania Ave., Newark, N. J. (Parchment Paper.)
Trio Mfg Co., 610 N. American, Philadelphia, Pa. (Silk.)
Troy Art Studio, 624 2d Ave., Troy, N. Y.
Utility Shade Co., Tenafly, N. J.
Vogue Lamp & Shade Co., 130 W. 17th, New York, N. Y. (Parchment.)
Volkman & Co., 3223 W. Lake, Chicago, Ill.
Wardwell, E. H., 11 E. 36th, New York, N. Y.

SHADES AND DOMES

Leaded, Mosaic or Figured, Stamped or Cast Metal.
Art Shade Co., 224 N. Desplaines, Chicago, Ill.
Badanes Mfg. Co., 62 Greene, New York, N. Y.
Bayley & Sons, 105 Vanderveer, Brooklyn, N. Y.
Mutual Sunset Lamp Co., 21 E. Houston, New York, N. Y
Western Art Glass Shade Works, 101 Turk, San Francisco.

SHADES, FACTORY WINDOW. See Window Shades, Factory.

SHADES, Metallic

Tin, Aluminum, Brass, Copper, Zinc, Steel.
A. A. Elec. Mfg. Co., Bridgeport, Conn. (Sole selling agent, Harry Pickhardt, 129 W. 15th, New York, N. Y.)
Durex. See Wheeler Reflector Co.
Faries Mfg. Co., Decatur, Ill. (Brass, Aluminum, Tin, Copper.)
Frink Co., Inc., 369 Lexington Ave., New York, N. Y. (Aluminum, Brass, Zinc, Iron, Steel.)
Hubbell, Inc., Harvey, Bridgeport, Conn. (Aluminum, Brass Steel, Tin.)
Miller Co., Meriden, Conn.
Monk, H. E., 18 Warren, New York, N. Y. (Tin, Aluminum, Brass, Copper, Zinc & Steel).
Oamco. See Overbaugh & Ayres Mfg. Co.
Overbaugh & Ayres Mfg. Co., 411 S. Clinton, Chicago, Ill
Richardson Reflector Co., 16 Hudson, New York, N. Y.
Western Reflector Co., 1221 W. Madison, Chicago. (Tin.)
Wheeler Reflector Co., 275 Congress, Boston, Mass.

SHADES, Mica

Hirsch Mica Co., 1087 Flushing Ave., Brooklyn, N. Y
Huse-Liberty Mica Co., 73 Long Wharf, Boston, Mass.
Kant-Krack. See Huse Liberty Mica Co.
Mica Insulator Co., 200 Varick, New York, N. Y.
Storrs Mica Co., 11 Park Place, New York, N. Y.
Tar Heel Mica Co., Plumtree, N. C.
Tarmilite. See Tar Heel Mica Co.

SHAFT COUPLINGS. See Couplings, Shaft.
SHAFTS, Flexible. See Tubing, Flexible Metallic.

SHEARS, Insulation

Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.

SHEET STEEL CABINETS. See Cabinets, Sheet Steel.

SHELLS, Screw Socket

Chase Brass & Copper Co., Waterbury, Conn.
Dallas Brass & Copper Co., 820 Orleans, Chicago, Ill.
Patton-MacGuyer Co., Providence, R. I.
Risdon Mfg. Co., Naugatuck, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Torrington Mfg. Co., 70 Franklin, Torrington, Conn.
Waterbury Brass Goods Corp., Waterbury, Conn.
Waterbury Button & Moulding Co., Waterbury, Conn. (Miniature.)

SHUNTS, Instruments. See Instruments, Laboratory Standard.
SIGN FLASHERS. See Flashers, Sign.
SIGN LETTER LENSES. See Lenses.

SILICA

Ottawa Silica Co., Ottawa, Ill. "Flint Shot."
SILK, Cloth Insulated. See Cloth & Paper.
Shades. See Shades, Fabric.
Tape. See Tape.
Thread. See Yarn, etc.

SILVER, Metal and Wire

Baker & Co., Inc., 54 Austin, Newark, N. J.
Gilby Wire Co., Riverside Ave., Newark, N. J.
Handy & Harman, 57 William, New York, N. Y.
Wilco. See Wilson Co., H. A.
Wilson Co., H. A., 97 Chestnut, Newark, N. J.

SILVER SOLDER. See Solder, Silver.
SINE WAVE OSCILLATORS. See Instruments, Laboratory Standard.
SIGN ELECTRODES, Gas. See Electrodes for Gas Signs.
SKINNERS WIRE. See Scrapers.
SLABS, Switchboard. See Asbestus Slabs; also Molded Insulation, Slate; Soapstone.

SLATE

For Switchboard Slabs and Barriers.
Davis Slate & Mfg. Co., 618 E. 40th, Chicago, Ill.
Electrical Specialties Corp., 50 Pearl, Boston, Mass.
Fair Haven Marble & Marbleized Slate Co., Fair Haven, Vt.
Penrhyn Slate Co., Hydeville, Vt.

Fair Haven Marble & Marbleized Slate Co. SLATE
Fair Haven Vermont GOODS

PORTLAND-MONSON SLATE CO.
PORTLAND-MONSON SLATE CO. TRADE MARK PORTLAND, ME.
Quarriers of
Monson Slate
for Electrical
Purposes, Natural
Black, Oil Finish
Quarries:
Monson, Maine
Office, Portland, Maine

Portland-Monson Slate Co., Portland, Me.
Structural Slate Co., Pen Argyl, Pa.

SLEEVE-BEARINGS. See Bearings and Bushings
SLEEVING, Cotton. See Tape, Cotton.
SLOTTING FILES. See Files, Commutator Slotting.

SLOTTING MACHINES and TOOLS, Commutator

(Mica Undercutters).
Allen Electric & Equipment Co., Kalamazoo, Michigan.
Binghamton Flexible Shaft Co., Binghamton, N. Y.
Burton & Rogers Co., 857 Boylston, Boston, Mass.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
General Electric Co., Schenectady, N. Y.
Hobart Bros. Co., Troy, Ohio.
Hullhorst Micro Tool Co., 3240 E. Monroe, Toledo, O.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Imperial. See Martindale Elec. Co.
Martindale Electric Co., 1262 W. Fourth, Cleveland, Ohio.
Onan, David W., 43 Royalstone Ave., Minneapolis, Minn.
Peerless. See Electric Service Supplies Co.
Ransom & Randolph Co., Superior & Chestnut, Toledo, Ohio
Simplex. See Weidenhoff, Joseph.
South Bend Lathe Works, 425 E. Madison, South Bend, Ind.
Weidenhoff, Joseph, 4352 Roosevelt Rd., Chicago, Ill.
White Dental Mfg. Co., S. S., 152 W. 42nd, New York.

SNAP SWITCHES. See Switches, Snap

SOAPSTONE

For Switchboard Slabs and Barriers.
Alberene Stone Co., 153 W. 23rd, New York, N. Y.
Kirchberger & Co., Inc., 1425 37th, Brooklyn, N. J.
Lin-Stun. See Westinghouse.
Westinghouse Elec & Mfg. Co., East Pittsburgh, Pa.

SOCKET LININGS. See Linings, Socket
SOCKET SHELLS. See Shells, Screw Socket.
SOCKETS, Flashing. See Flashers, Sign.

SOCKET Chain Attachments

Chain Links, Chain Adjusters, Acorns, Extensions, Insulated Chain Splicers.
Abbott. See Harvey Hubbell, Inc.
Arrow Electric Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Bryant Electric Co., Bridgeport, Conn.
Duplex. See Warner Bros. Co.
Eade, John E., 104 Point, Providence, R. I. Links, Insulators.
Easylite. See Rittenhouse Co., A. E.
Economy. See Harvey Hubbell, Inc.
Flory, Wm. E., 38 W. 32nd, New York, N. Y. (Decorative Pull Chains.)
Gripper. See Wittenberg Bros.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. (Metal Pull Tassel.)
Hubbell, Inc., Harvey, Bridgeport, Conn. (Links and Acorns. Metal Pull Tassels.)
Paiste. See Hart & Hegeman Mfg. Co.
Pass & Seymour, Inc., Solvay Sta., Syracuse, N. Y. (Pull Chain Tassel.)
P. & S. See Pass & Seymour, Inc.
Rittenhouse Co., A. E., Honeoye Falls, N. Y. (Sole Selling Agent, Hatheway & Co., 16 Hudson, New York, N. Y.)
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Royal. See Sears, Henry D.
Scovil Mfg. Co., Waterbury, Conn. (Acorn.)
Sears, Henry D., 50 Boylston, Boston, Mass
Waterbury Brass Goods Co., Waterbury, Conn. (Acorns.)
Weber. See Sears, Henry D.
Wittenberg Bros., 60 Shipman, Newark, N. J. Links, Insu-

SOCKET REDUCERS

Arrow Elec. Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Cen-del-lite. See Sears, Henry D.
Eagle Electric Mfg. Co., 79 Hall, New York, N. Y.
Electric Co., 94 Allyn, Hartford, Conn.
General Electric Co., Merchandise Dept., Bridgeport, Conn
Hart & Hegaman Div. of Arrow-Hart & Hegeman Elec. Co. Hartford, Conn.
Morse Co., Frank W., 291 Congress, Boston, Mass.
Pass & Seymour, Solvay Sta., Syracuse, N. Y.
Propp Co., M., 524 Broadway, New York, N. Y.
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Sears, Henry D., 50 Boylston, Boston, Mass.

SOCKETS, Radio. See Radio Receiver Parts.

SOCKETS AND RECEPTACLES, Lamp

Bases other than Standard (or Medium) are indicated as follows: Mogul, M; Candelabra (or Miniature), C.

Key	See K
Composition	See W
Metal Shell	See B
Porcelain	See A
Pull Chain	See P
Push Through	See T
Sign Receptacles	See A

A. B. C. See Leviton Mfg. Co.
Acme Elec. & Mfg. Co., Canal & Hamilton Ave., Trenton, N. J. . . . . A
Ajax Elec. Specialty Co., 1926 Chestnut, St. Louis, Mo. . . . . W
Alabax. See Arrow Elec. Co.
Alcor Mfg. Co., 4605 W. Madison, Chicago, Ill. C
Appleton Electric Co., 1730 Wellington Ave., Chicago, Ill. . . . . A
Armstrong & White, 9th and Liberty Ave., Pittsburgh, Pa. . . . . A
Arrow Elec. Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. M C K T P B A
Arrogrip. See Arrow Elec. Co.
A. & W. See General Outdoor Adv. Co.
Beaver Mfg. Co., 625 N. Third, Newark, N. J. . . . . C . . . . P B . .

Best. See United States Elec. Mfg. Corp.
Bryant Elec. Co., Bridgeport. . . . . M C K T P B A
C-H. See Cutler-Hammer Mfg. Co.
Circle F Mfg. Co., Trenton, N. J. . . . M . . K T P B A
Circle T. See Trumbull Elec. Mfg. Co.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn. . . . . .
Connecticut Elec. Mfg. Co., Bridgeport, Conn. . . . . M . . K T . . B A
Crouse-Hinds Co., Syracuse, N. Y. . . A W . . . . . .
Cutler-Hammer, Inc., 1287 St. Paul Ave., Milwaukee, Wis. . . . . K T . . B A
Durex. See Wheeler Reflector Co.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn
Economy Fuse & Mfg. Co., 2717 Greenview Ave., Chicago, Ill. . . . . P B . .
Far-Go Elec. Mfg. Co., 368 Broome, New York, N. Y. . . . . C . . . . . .
Federal Electric Co., 8700 S. State, Chicago, Ill. . . . . A
Flute. See Pass & Seymour.
Flutelier. See Pass & Seymour.
Frink Co., Inc., 369 Lexington Ave., New York, N. Y. . . . . M C . . . . . B . .
Gaynor Elec. Co., Stratford, Conn. . . . . A
General Elec. Co., Merchandise Dept., Bridgeport, Conn. . . . . M C K T P B A
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. . . . . M C K T P B A
Hoosick Falls Radio & Elec'l Parts Mfg. Co., Hoosick Falls, N. Y. . . . . W . . . . . .
Horan Co., E. S., 550 Monroe, Carlstadt, N. J. . . . . A
Hubbell, Inc., Harvey, Bridgeport, Conn. M C K T P B A
H. & H. See Hart & Hegeman.
I-D-A. See Watson Mfg. Co., J. E.
K-E Cleat Receptacle. See Kirkman.
Kirkman Engineering Co., 1 Dominick, New York. (Cleat Receptacle.) . . . . . .
Leader. See Leviton Mfg. Co.
Leiser & Co., W. A., 1607 Sansom, Philadelphia, Pa. . . . . A
Leviton Mfg. Co., 225 Newell, Brooklyn, N. Y. . . . . M C K . . P B A
Levolier. See McGill Mfg. Co.
Liberty Bell. See Hart & Hegeman.
Locat-A-Catch. See Connecticut.
McGill Mfg. Co., Valparaiso, Ind. . . . . P B A
Majestic Elec. Mfg. Co., 806 N. 12th, St. Louis. (Lamp Receptacle.) . . . . . A
Molded Socket Corp., Railroad, Pa. . . . K . . . . . .
Multi Elec'l Mfg. Co., 1840 W. 14th, Chicago, Ill. . . . . A
Multilok. See Circle F Mfg. Co.
Newgard. See Multi Elec'l Mfg. Co.
New Wrinkle. See Bryant Elec.
Noark. See Colt's Patent Fire Arms.
One 4 All. See Propp Co., M.
P. & S. See Pass & Seymour.
Pass & Seymour, Solvay Station, Syracuse, N. Y. . . . . M C K T P B A
Paulding, John I., New Bedford, Mass. . . . . B A
Perkins. See Bryant Elec. Co.
Porcelain Products, Inc., Findlay, O. . . . . A
Propp Co., M., 524 Broadway, New York, N. Y. . . . . .
Quick Catch. See Hubbell, Inc.
Royal. See Sears, Henry D.
Ryan Appliance Co., 117 Mulberry, Trenton, N. J. . . . . W . . . . . A
Safti Soc. See Molded Socket Corp.
Sears, Henry D., 80 Boylston, Boston M C K T P B A
Security. See Circle F Mfg. Co.
Shurlock. See Pass & Seymour.
Siemen Co., Bridgeport, Conn. . . . . .
Taplet Mfg. Co., 3709 Powelton Ave., Philadelphia, Pa. . . . . A
Titan. See Bryant Elec. Co.
Trumbull Elec. Mfg. Co., Plainville, Conn. . . . . A
Union Insul. Co., Parkersburg, W. Va. . . . . .
United States Elec. Mfg. Corp., 222 W. 14th, New York, N. Y. . . . . P . . B . . W
U. S. Electric Co., 311 Chambers St., Trenton, N. J. . . . . A
Waleo. See Leiser & Co., W. A.
Waterbury Button & Moulding Co., Waterbury, Conn. . . . . .
Watson Mfg. Co., J. E., 5506 N. Fifth, Philadelphia, Pa. (Concealed Fixture) . . . . . P B . .
Weber. See Sears, Henry D.
Wheeler Reflector Co., 275 Congress St., Boston, Mass. . . . . P . . .
Wood Electric Co., C. D., 565 Broadway, New York. (Sign Receptacles.) . . . . . A
Woodwin. See Wood Elec. Co.
Wrinklet. See Bryant Elec. Co.

SOLDER, Aluminum

Allen Co., Inc., L. B., 6750 Bryn Mawr Ave., Chicago, Ill.
Aluminum Solder Corp. of America, 730 Fifth Ave., New York, N. Y.
Lasher-Weeber Co., 261 Franklin, Boston, Mass.
Lenk Mfg. Co., 30 Merrimac, Boston, Mass.
Platt Bros. & Co., Waterbury, Conn.
Solderlume. See Aluminum Solder Corp. of America.
Supreme. See Lasher-Weeber Co.
Union Smelting & Refining Co., Newark, N. J.
Usarco. See Union Smelting & Refining Co.

SOLDER, Bar and Wire

Eagle. See Hoyt Metal Co.
Genuine A. See Hoyt Metal Co.
Hoyt Metal Co., St. Louis, Mo.
National Bearing Metal Corp., Div. More-Jones Brass & Metal Co., 4930 Manchester Ave., St. Louis, Mo.

SOLDER, Self-Fluxing

Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh.
American Solder & Flux Co., 2910 N. 16th, Philadelphia.
Dutch-Boy. See National Lead Co.
Gardiner Metal Co., 1366 W. Lake, Chicago, Ill.
Kester Solder Co., 4210 Wrightwood Ave., Chicago, Ill.
Lenk Mfg. Co., 32 Merrimac, Boston, Mass.
National Lead Co., 111 Broadway, New York, N. Y.
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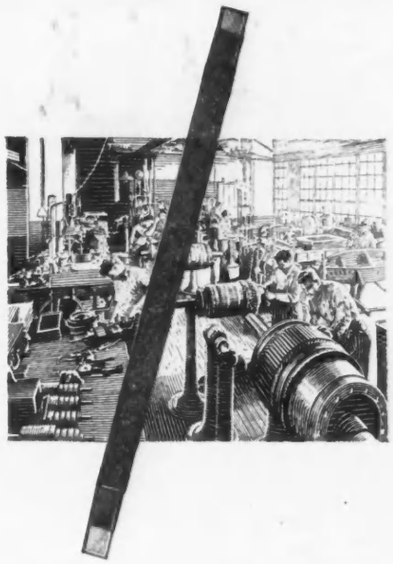

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Amco. See American Solder & Flux Co.
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Central Stamping Co., 206 Broadway, New York, N. Y. Paste and Salts.
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Conductalute. See Technical Products Co.
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Lukens Metal Co., T. F., 1105 Fairmount Ave., Philadelphia, Pa.
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Solderite, Inc., 22 Green, Newark, N. J.
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Technical Products Co., Pittsburgh, Pa. (Paste.)
Tinol. See American Solder & Flux Co.
Van Cleef Bros., 7722 Woodlawn Ave., Chicago, Ill.
Weaver Specialty Co., 6344 Aurelia, Pittsburgh, Pa.
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American Elect. Heater Co., Detroit, Mich.
B-D. See Bleadon-Dun Co.
Beardsley & Wolcott Mfg. Co., Waterbury, Conn.
Beckwith Machine Co., 402 N. Chestnut, Ravenna, Ohio.
Betsy Ross. See Central Flatiron Mfg. Co.
Bleadon-Dun Co., 2300 Warren Ave., Chicago, Ill.
Brach Mfg. Corp., L. S., Newark, N. J.
Burnley Battery & Mfg. Co., North East, Pa.
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Chapman Machine Co., Terryville, Conn.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Davis Specialty Works, East Gary, Ind.
Dominion Elec'l Mfg. Co., 712 Ontario Ave., N., Minneapolis.
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Drake Elec. Wks., 3943 Lincoln Ave., Chicago, Ill.
Edison Elec. Appliance Co., 5618 W. Taylor, Chicago, Ill.
Electrahot Mfg. Co., 525 S. 4th, Minneapolis, Minn.
Electric Heat Control Co., 5902 Carnegie Ave., Cleveland. (Transformer Soldering Outfit.)
Electric Soldering Iron Co., Inc., 135 W. 17th, New York.
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Industrial. See Permaw Mfg. Co.
Jiffy. See Koch & Co., Paul W.
Junior. See Drake Elec. Wks.
King. See Electric Heat Control Co.
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Loxan. See Simplex Flux & Solder Co. of America.
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Northern Elec. Co., 2833 N. Western Ave., Chicago, Ill.
Queen Quality. See Watlow Elec. Mfg. Co.
Quick-Hot. See Moto-Ray Mfg. Co.
Radio. See Drake Elec. Wks.
Regular. See National Specialties Co.
Reliance. See Landers, Frary & Clark.
Samson Cutlery Co., 8 Jones St., Rochester, N. Y.
Silver King. See Illinois Stamping & Mfg. Co.
Simplex Flux & Solder Co. of America, 1965 E. 66th, Cleveland, O.
Superior Elec. Products Corp., 1300 S. 13th, St. Louis, Mo.
Swartzbaugh Mfg. Co., 1501 W. Bancroft, Toledo, O.
Torrid. See Beardsley & Wolcott Mfg. Co.
Trent, Harold E., 295 N. Lawrence, Philadelphia, Pa.
Varick Elec. Mfg. Co., 28 E. 21st St., New York, N. Y.
Vulcan Elec Heating Co., 225 Varick, New York, N. Y.
Waage Elec. Co., 5100 W. Ravenswood Ave., Chicago, Ill.
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Metal Specialties Mfg. Co., 338 N. Kedzie Ave., Chicago.
Macleod Co., 2232 Bogen, Cincinnati, O.
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Gibson Co., Wm. D., 1899 Clybourn Ave., Chicago, Ill.
Hubbard Spring Co., M. D., Pontiac, Mich.
Lee Spring Co., 34 Main, Brooklyn, N. Y.
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Hunter Pressed Steel Co., Landsdale, Pa.
Newcomb Spring Corp., 234 40th, Brooklyn, N. Y.
Peck Spring Co., Plainville, Conn.
Peterson Spring Co., 1660 Beard Ave., Detroit, Mich.
Rapid Spring Co., 222 Second Ave., Pittsburgh, Pa.
Raymond Mfg. Co., Corry, Pa.
Standard Spring and Manufacturing Co., 236-42nd St., Brooklyn, N. Y.
Steinen & Co., 297 Washington, Newark, N. J.
Young Industries, Inc., L. A., Detroit, Mich.

STAMPED BOXES. See Cabinets, Sheet Steel.

STAMPINGS, Fibre. See Fibre.
Sheet Metal. See Fixture Fittings.
Sheet Steel. See Stampings, Sheet Steel.
Small. See Stampings, Small.

STAMPINGS, Sheet Steel
Heavy Stamping and Drawing.
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American Stamping Co., 978 E. 64th, Cleveland, O.
Bartlett-Thompson Co., 67 Sudbury, Boston, Mass.
Bossert Corp., 1002 Oswego St., Utica, N. Y.
Eureka Tinware Mfg. Co., 135 W. 20th, New York, N. Y.
Faries Mfg. Co., Decatur, Ill.
Fischer Spring Co., Chas., 238 Kent Ave., Brooklyn, N. Y.
Geuder, Paeschke & Frey, St. Paul & 15th, Milwaukee.
Hubbard & Co., Pittsburgh, Pa.
Janney, Jr., Joseph A., 1421 Chestnut St., Philadelphia.
Massachusetts Machine Shop, Inc., Boston, Mass.
Mathews Mfg. Co., 104 Gold, Worcester, Mass.
Metropolitan Devices Corp., 1250 Atlantic Ave., Brooklyn.
Mullins Mfg. Corp., Washing Machine Division, Salem, Ohio. (Vitreous Enameled)
Thomas & Skinner Steel Products Co., 1102 E. 23rd, Indianapolis, Ind.
Truscon Steel Co., Youngstown, O.
United States Stamping Co., Moundsville, W. Va.

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Aerial Machine & Tool Co., 79 Grand, New York, N. Y.
American Radio Hardware Co., 135 Grand, New York, N. Y.
American Stamping Co., 978 E. 64th, Cleveland, O.
Arrow Automatic Products Corp., 37 Vestry, New York, N. Y.
Barnes Co., Wallace, Bristol, Conn.
Beaver Mfg. Co., 625 N. Third, Newark, N. J.
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Hubbard Spring Co., M. D., Pontiac, Mich.
Hubbell, Inc., Harvey, Bridgeport, Conn.
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Lansing Stamping Co., Lansing, Mich.
Lenz Metal Stamping Wks., J., 199 Franklin, New York.
Massachusetts Machine Shop, Inc., Boston, Mass.
Mathews Mfg. Co., 104 Gold, Worcester, Mass.
Mechanics Tool & Stamping Co., 7 Summer, Worcester, Mass
Mutual. See Bull Dog Elec. Products Co.
Patton-MacGuyer Co., Providence, R. I.
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Precision Metal Workers, 3100 Carroll Ave., Chicago, Ill.
Premax Products, Inc., 230 Tenth, Niagara Falls, N. Y.
Quadriga Mfg. Co., 213 W. Grand Ave., Chicago, Ill.
Risdon Mfg. Co., Naugatuck, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Sherman Mfg. Co., H. B., Battle Creek, Mich.
Signal Elec. Mfg. Co., Menominee, Mich.
Sons Mfg. Co., Roselle, N. J.
Steinen & Co., 297 Washington, Newark, N. J.
Thomas & Skinner Steel Products Co., 1102 E. 23rd, Indianapolis, Ind.
United Stamping & Mfg. Co., Cleveland, Ohio.
United States Stamping Co., Moundsville, W. Va.
Valley Appliances, Inc., 634 Lexington Ave., Rochester, N. Y.
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Waterbury Button & Moulding Co., Waterbury, Conn.
Waterbury Mfg. Co., 236 Grand, Waterbury, Conn.
Waterbury Metal Wares Co., Waterbury, Conn.
Western Cartridge Co., East Alton, Ill.
Zierick Machine Wks., F. R., 68 E. 131st St., New York, N. Y.

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Electric Service Supplies Co., 17 & Cambria Sts., Philadelphia, Pa.
Onan, David W., 43 Royalstone Ave., Minneapolis, Minn
Peerless. See Electric Service Supplies Co.
Ridlon Company, Frank, Boston, Mass.
Weidenhoff, Joseph, 4352 Roosevelt Rd., Chicago, Ill.

STARTERS, Motor. See Controllers, Motor; Switches, Remote Control; Switches, Knife; Safety; Switches, Snap (Heavy Duty).

STEATITE. See Cores, Resistance Coil.

STEEL CASTINGS. See Castings, Steel.

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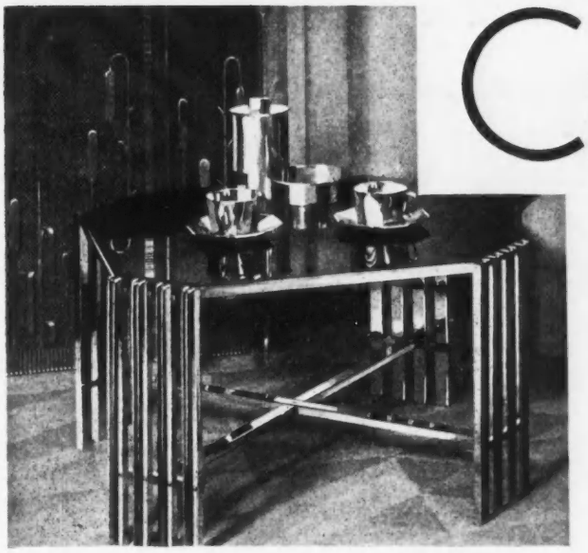

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United Chromium, Inc., is organized to render a valuable licensing service. This service assures manufacturers of the finest Chromium Plating on a definite production basis. It relieves them of uncertainty; guards them against failure and the losses due to rejects. . . . It includes the supervision of new plant installations; coaching of platers and control and maintenance of solutions by periodic tests.

It would be a pleasure to send details of this licensing service to manufacturers who contemplate using Chromium Plate on their products. Names of our jobbing licensees will be sent to manufacturers whose present needs do not justify their own plating department.

UNITED CHROMIUM
INCORPORATED

Executive Office: 51 East 42nd Street, New York City

Chicago, Ill. ◆ *Cleveland, O.*

Detroit, Mich. ◆ *San Francisco, Calif.* ◆ *Waterbury, Conn.*

STEEL for Electric Appliances
Elyria Iron & Steel Co., Elyria, O.
Ryerson & Son, Jos., 2558 W. 16th, Chicago, Ill.

STEEL, Magnet
Ajax Electrothermic Corp., Trenton, N. J.
Hercules Elec. Steel Corp., 145 Lafayette St., New York.
Indiana Steel Products Co., 4545 S. Western Ave., Chicago.
Ludlum Steel Co., Watervliet, N. Y.
Reed Co., Jr., David, 85 Adams, Brooklyn, N. Y.
Swedmag. See Reid Co., Jr., David.

STEEL SHEETS
Agathon. See Central Alloy Steel Corp.
Allegheny Steel Co., Brackenridge, Pa.
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh.
Armco. See International Corp., Middletown, O.
Armelec. See Empire Steel Corp.
Central Alloy Steel Corp., Massillon, O.
Cyclops Steel Co., Titusville, Pa.
Dynelec. See Empire Steel Corp.
Empire Steel Corp., Mansfield, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Manelec. See Empire Steel Corp.
Metelec. See Empire Steel Corp.
Newport Rolling Mill Co., Newport, Ky.
Polelec. See Empire Steel Corp.
Republic Iron & Steel Co., 335 Market, Youngstown, O
Tranelec. See Empire Steel Corp.
Unilov. See Universal Steel Co.
Universal Steel Co., Bridgeville, Pa.
Wheeling Steel Corp., Wheeling, W. Va.

STEEL, STRIP. See Strip Steel.

STOCKS, Dies and Reamers
Hall-Will, Inc., Twelfth & Cranberry, Erie, Pa.
Red-E-Hail. See Hall-Will, Inc.
Toledo Pipe Threading Machine Co., 1445 Summit, Toledo, O.

STONES, Commutator
Acme. See Green Equipment Corp.
Caro. See Electric Service Supplies Co.
Cleveland Stone Co., Union Trust Bldg., Cleveland, O.
Co-operative Utilities Co., 1503 Columbia Ave., Philadelphia, Pa.
Diamond Dee. See Co-operative Utilities Co.
Electric Service Supplies Co., 17th and Cambria, Philadelphia, Pa.
Green Equipment Corp., Monadnock Block, Chicago, Ill.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Imperial. See Martindale Electric Co.
Lombard & Co., Somerville, Mass.
Martindale Elec. Co., 1262 W. Fourth, Cleveland, O.

STOOLS, Factory; Steel
Angle Steel Stool Co., Plainwell, Mich.
Chicago Wire Chair Co., 613 N. La Salle, Chicago, Ill.
Royal Metal Mfg. Co., 1136 South Michigan Ave., Chicago.

STORAGE
Battery Plates. See Plates, Storage Battery.
Battery, Separators. See Separators.
Tools. See Tools, Storage Battery.

STRAINING MACHINES, INSULATION. See Wire Manufacturing Machines.

STRAIGHTENERS, Armature Shaft
Columbia Machine Works & Malleable Iron Co., Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

STRANDING MACHINES. See Wire Manufacturing Machines.

STRIP STEEL
(Hot and Cold Roll).
Acme Steel Co., 2840 Archer Ave., Chicago, Ill. (Hot & Cold).
American Steel & Wire Co., 208 S. La Salle, Chicago, Ill. (Cold).
Athenia Steel Co., 135 William, New York, N. Y. (Cold.)
Barnes Co., Wallace, Bristol, Conn. (Hot.)
Central Alloy Steel Corp., Massillon, O. (Hot.)
Griffin Mfg. Co., Huron & Cherry, Erie, Pa. (Cold.)
Laclede Steel Co., 8th & Olive Sts., St. Louis, Mo. (Hot.)
Latrobe Electric Steel Co., Latrobe, Pa. (Hot & Cold.)
Republic Iron & Steel Co., 335 Market, Youngstown, O
Sharon Steel Hoop Co., Sharon, Pa. (Hot.)
Stanley Wks., New Britain, Conn. (Hot & Cold.)
Steel and Tubes, Inc., Cleveland, O. (Hot & Cold.)
Superior Steel Corp., Union Trust Bldg., Pittsburgh, Pa. (Hot & Cold.)
Thomas Steel Co., Warren, Ohio.
West Leechburg Steel Co., Farmers Bank Bldg., Pittsburgh, Pa. (Hot & Cold.)

STRIPPERS, Wire
Acme. See A. Laubscher.
Artos Engineering Co., 115 Brown, Milwaukee, Wis. (Cutting, Stripping and Measuring).
Austin Co. M. B., 108 S. Desplaines, Chicago, Ill.
Colonial-Premier Co., 229 W. Ohio, Chicago, Ill.
Dicke Tool Co., Downers Grove, Ill.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
E-Z. See Pyramid Products Co.
F. F. See France Mfg. Co.
France Mfg. Co., 10306 Berea Rd., Cleveland. (Motor Driven.)
Goehst. See Klein & Son.
Hartman. See Service Sales & Mfg. Co.
Ideal Commutator Dresser Co., 1008 Park Ave., Sycamore, Ill.
Ives Mfg. Co., Meriden, Conn.
Klein & Sons, Mathias, Chicago, Ill.
Laubscher, A., 77 Fort Pleasant Ave., Springfield, Mass.
Perfection. See Weber Machine Corp.
Pyramid Products Co., 2311 S. State, Chicago, Ill.
Service Sales & Mfg. Co., 17005 Melgrave Ave., Cleveland, Ohio.
Speedcraft. See Wire Stripper Co.
Thomas Steel Products Co., Warren, Ohio.
Weber Machine Corp., 33 S. Water, Rochester, N. Y.
Wire Stripper Co., 507 Erie Bldg., Cleveland, O.
Zierick Machine Wks., F. R., 6 Howard, New York City. (Motor Driven Stripper & Twister).

SWITCHBOARD INSTRUMENTS. See Instruments, Portable and Switchboard.

SWITCHBOARD OPALS. See Lenses.

SWITCHBOARDS, SLABS AND BARRIERS
See Asbestos Slabs; Molded Insulation; Slate; Soapstone.

SWITCH (Switches)
Arms. See Posts, Binding.
"Across the Line" Type See Controllers, Motor.
Baby Knife. See Switches, Battery.
Battery. See Switches, Battery.
Canopy. See Switches, Snap.
Clock Operated. See Switches, Time.
Feed Through. See Switches, Snap.
Fixture. See Switches, Snap.
Float. See Switches, Tank.
Flush. See Switches, Snap.
Handles. See Handles, Wood
Knife, Baby. See Switches, Battery & Baby Knife.
Lever Radio. See Radio Mounting.
Lever. See Switches, Snap, Lever.
Limit. See Controllers, Motor.
Mercury. See Switches, Mercury
Motor Starting. Magnetic Type. See Controllers.
Motor Starting. Non-Magnetic. See Switches, Motor Starting.
Pendant. See Switches, Snap.
Pressure Regulating. See Controllers.
Push Button, Snap. See Switches, Snap.
Push Button, Motor Starting. See Switches, Remote Control
Radio Receiver. See Radio Mountings.
Range. See Switches Snap; Heavy Duty
Remote Control. See Switches, Remote Control.
Reversing. See Controllers.
Rotary. See Switches, Snap.
Safety. See Switches, Knife.
Snap. See Switches, Snap.
Starter Type. See Controllers.
Storage Battery. See Switches, Storage Battery.
Surface. See Switches, Snap.
Tank. See Switches, Tank.
Time. See Switches, Time.
Toggle. See Switches, Snap.
Tumbler. See Switches, Snap.

SWITCHES, Battery and Baby Knife
Cut-Out Switches.
Anti-Wood. See Keil & Son, Francis.
Bridgeport Switch Co., 209 Center, Bridgeport, Conn.
Bryant Electric Co., Bridgeport, Conn.
Chapman. See Frank W. Morse & Co.
Chicago Elec. Mfg. Co., 2801 S. Halsted, Chicago, Ill.
Jefferson Electric Co., 1503 S. Laflin, Chicago, Ill.
Circle T. See Trumbull Elec. Mfg. Co.
Connecticut Elec. Mfg. Co., Bridgeport, Conn.
Crown. See Edwards & Co., Inc.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Diamond H. See Hart Mfg. Co.
Edwards & Co., Inc., 140th & Exterior, New York, N. Y.
Electrad, Inc., 428 Broadway, New York, N. Y.
Eureka. See Frank W. Morse & Co.
Fahnestock Elec. Co., cor. East Ave. and 8th, Long Island City, N. Y.
Handy. See Chicago Elec. Mfg. Co.
H. & H. See Hart & Hegeman Div.
Hart Mfg. Co., Hartford, Conn.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co. Hartford, Conn. (Push Button.)
Harwood. See Frank W. Morse & Co.
Heinemann Elec. Co., Trenton, N. J.
Jost. See Frank W. Morse & Co.
Kappa. See Trumbull Elec. Mfg. Co.
Keil & Son, Francis, 401 E. 163rd, New York, N. Y.
Kendrick & Davis Co., Lebanon, N. H.
Keystone. See Frank W. Morse & Co.
King Mfg. Co., B. C., 302 Park Ave., Brooklyn, N. Y.
Knox Porcelain Corp., Knoxville, Tenn.
K-P-F Elec. Co., 855 Howard St., San Francisco, Cal.
Kurz & Root, Appleton, Wis.
Leviton Mfg. Co., 226 Newell, Brooklyn, N. Y.
Lyons Mfg. Co. (Mt. Carmel), New Haven, Conn.
Majestic Elec. Mfg. Co., 80 N. 12th St., St. Louis, Mo.
Manhattan Elecl. Supply Co., 510 Sixth Ave., New York.
Morse Co., Frank W., Boston, Mass.
Partrick & Wilkins Co., Philadelphia, Pa.
Porcelain Products, Inc., Findlay, Ohio.
Powerlite Switchboard Mfg. Co., 4149 E. 79th, Cleveland, O.
Pullrite. See Frank W. Morse & Co.
Reliable Electric Co., 3145 Carroll Ave., Chicago, Ill.
Samson Electric Co., Canton, Mass.
Spero Elec. Mfg. Co., E. 33rd and Woodland Ave., Cleveland
Sta-Rite. See Frank W. Morse & Co.
Trumbull Elec. Mfg. Co., Plainville, Conn.
Wood Elec. Co., C. D., 565 Broadway, New York, N. Y.

SWITCHES, Mercury
(For Temperature Control Apparatus.)
Con-Tac-Tor. See Time-O-Stat Controls Co.
Cooper Hewitt Electric Co., 410 Eighth Ave., Hoboken, N. J.
Cramblet Engineering Div. of Time-O-Stat Controls Co., 286 Milwaukee, Milwaukee, Wis.
Febrice Thermostatic Control Co., 4750 Sheridan Rd., Chicago, Ill.
General Kontroler Co., 200 E. First, Dayton, O.
Kon-nec-tor. See Cooper Hewitt Elec. Co.
Kontax. See General Kontroler Co.
Machlett & Son, 46 William, Long Island City, N. Y.
Mercoid Corp., 564 W. Adams, Chicago, Ill.
Safety Regulator Co., 529 S. Mathews, Los Angeles, Cal.
Time-O-Stat Controls Co., Elkhart, Ind.

SWITCHES, Motor Starting
Accessible. See Trumbull-Vanderpool Elec. Mfg. Co.
Aces. See Colt's Patent Fire Arms Mfg. Co.
Adam Elec. Co., Frank, St. Louis, Mo.
Aurora Steel Products Co., Aurora, Ill.
Automatic Switch Co., 154 Grand, New York, N. Y.
Barber Elec. Mfg. Co., North Attleboro, Mass.
Bull Dog Electric Products Co., Detroit, Mich.
Circle T. See Trumbull Elec. Mfg. Co.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Columbia Metal Box Co., 226 E. 144th, New York, N. Y
Crouse-Hinds Co., Syracuse, N. Y.
E. W. See Trumbull Elec. Mfg. Co.
FA. See Adam Elec. Co., Frank.
F. A. Triumph. See Metropolitan Elec. Mfg. Co.
Federal Steel Products Co., 2 Ave. L., Newark, N. J.
Large-Dall Mfg. Co., 606 Cherry, Philadelphia, Pa
Leonard Elec. Mfg. Co., 2907 Perkins Ave., Cleveland O
Lundy Co., E. A., Fulton Bldg., Pittsburgh.
MacMillen Mfg. Co., 1400 N. Spring, Los Angeles, Cal.
Major. See Adam Elec. Co., Frank.
Mason. See Trumbull-Vanderpool Elec. Mfg. Co.
Metropolitan Device Corp., 1250 Atlantic Ave., Brooklyn, N. Y.
Metropolitan Elec. Mfg. Co., Blvd. at 14th, Long Island City, N. Y.
Murray. See Metropolitan Device Corp.
Mutual. See Bull Dog Elec. Products Co.
Naro. See Metropolitan Elec. Mfg. Co.
Noark. See Colt's Patent Fire Arms Mfg. Co.
Nublade. See Colt's Patent Fire Arms Mfg. Co.
Palmer Elec. & Mfg. Co., Waltham, Mass.
Robbins & Myers, Inc., Springfield, O.
Safe-Lock. See Trumbull-Vanderpool Elec. Mfg. Co.
Safelock. See Westinghouse Elec. & Mfg. Co.
Schmuckler & Sons, 2232 N. 28th, Philadelphia, Pa.
Square D Co., Detroit, Mich.
S. S. See Wadsworth Elec. Mfg. Co.
Tanner & Co., Wm. F., 511 Sharp, Baltimore, Md.
Trumbull Elec. Mfg. Co., Plainville, Conn.
Trumbull-Vanderpool Elec. Mfg. Co., Bantam, Conn.
T. V. Safelock. See Trumbull-Vanderpool Elec
Unisafti. See Metropolitan Device Corp.
Unit-Versal. See Bull Dog Elec. Products Co.
Universal Metal Box & Products Co.
V. V. Fittings Co., 711 Cherry, Philadelphia, Pa.
Wadsworth Elec. Mfg. Co., Covington, Ky.
Westinghouse Elec. & Mfg. Co., Mansfield, O.

SWITCHES, Remote Control
Push Button, Magnetically Operated.
Adam Electric Co., Frank, St. Louis, Mo.
Allen-Bradley Co., 494 Reed, Milwaukee, Wis.
Automatic Switch Co., 154 Grand, New York, N. Y.
Burke Controller Co., 369 Lexington Ave., New York, N. Y.
Clark Controller Co., 1146 E. 152nd, Cleveland, O.
Cramer & Co., R. W., 136 Liberty, New York, N. Y.
Cutler-Hammer, Inc., 1287 St. Paul Ave., Milwaukee.
Diamond H. See Hart Mfg. Co.
Dunco. See Struthers Dunn, Inc.
Electric Valve Mfg. Co., 68 Murray, New York, N. Y.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Hart Mfg. Co., Hartford, Conn.
H. P. See Palmer Elec. & Mfg. Co.
Industrial Controller Div. of Square D Co., Milwaukee, Wis.
Kato Engr. Co., Mankato, Minn.
Lincoln Elec. Co., Colt Rd. & Kirby Ave., Cleveland, O.
Major, F. A., System. See Adam Elec. Co.
Monitor Controller Co., 51 S. Gay, Baltimore, Md.
Palmer Elec. & Mfg. Co., Waltham, Mass.
Precise Mfg. Co., 254 Mill, Rochester, N. Y.
Protectoswitch. See Precise Mfg. Co.
R. C. O. C. See South Bend Current Controller Co.
Sauter. See Cramer & Co., R. W.
Signal Engineering & Mfg. Co., 146 W. 14th, New York
South Bend Current Controller Co., South Bend Ind
Struthers Dunn, Inc., 136 N. Juniper, Philadelphia, Pa.
Takamine Corp., 208 Rawson St., Long Island City, N. Y.
Teeple Co., L. R., 540 E. Ninth, Portland, Ore.
Triplock. See Monitor Controller Co.
Trumbull Elec. Mfg. Co., Plainville, Conn.
Zenith Elec. Co., 537 S. Dearborn, Chicago, Ill.

SWITCHES, Snap

	KEY
Feed Through	See p
Fixture (Canopy, Candelabra and Key Arm)	See F
Flush	See f
Lever, Toggle, Tumbler	See L
Pendant	See p
Push Button	See P
Rotary	See R
Surface	See s

See Also Switches, Snap; Heavy Duty.

Adam Electric Co., Frank, St. Louis, Mo.						
Anylite Elec. Co., Ft. Wayne, Ind.					L	
Arrow Electric Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.	f	s	p	P	R	L F
Arrow Head. See Arrow Elec.						
Beaver Mfg. Co., 625 N. Third, Newark, N. J.	f	p	P			F
Best. See United States Elec. Mfg. Corp.						
Brascolite. See Guth & Co., Edwin.						
Bremer Elec. Mfg. Co., 139 N. 7th, Philadelphia, Pa.	f					
Bridgeport Switch Co., 209 Center, Bridgeport, Conn.					L	F
Bryant Elec. Co., Bridgeport, Conn.	f	s	P	R	L	F
B. S. Co. See Bridgeport Switch Co.						
Carling Tool & Machine Co., 32 Union Place, Hartford, Conn.						F
Commercial. See Gaynor Electric Co.						
Connecticut Elec. Mfg. Co., Bridgeport, Conn.		p	P	R	L	F
Crouse-Hinds Co., Syracuse, N. Y.					L	
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis.			P		L	
Diamond H. See Hart Mfg. Co.						
Dugle. See Bryant Elec. Co.						
Economy Fuse Mfg. Co., 2717 Greenview Ave., Chicago, Ill.						F
Gaynor Elec. Co., Stratford, Conn.	f				L	
General Elec. Co., Bridgeport, Conn.	f	s	p	P	R	L F
Glo-Guide. See Bryant Elec. Co.						
Gold Star Push Switch. See Hart & Hegeman.						
Guth & Co., Edwin, 2615 Washington Ave., St. Louis, Mo.						
Hart Mfg. Co., Hartford, Conn.	f	s	p	P	R	L
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co. (Door Bolt Control)	f	s	p	P	R	L F
Hart. See Hart & Hegeman.						
H. & H. See Hart & Hegeman Mfg. Co.						
Hubbell, Inc., Harvey, Bridgeport, Conn.		s	p			L F
Jost. See Morse, Frank W.						
Keil & Son, Francis, 401 E. 163rd, New York, N. Y.	f		P			
Leviton Mfg. Co., 226 Newell, Brooklyn						F
Levoller. See McGill Mfg. Co.						
McGill Mfg. Co., Valparaiso, Ind.	f				L	F
Marks Products Co., 80 N. Ninth, Brooklyn, N. Y.					L	F
Metropolitan Elec. Mfg. Co., Blvd at 14th St., Long Island City, N. Y.		s			R	
Morse Co., Frank W., 291 Congress, Boston				P		
National. See Standard Elec. Mfg. Co.						
New England. See Paulding, John L.						
Nutmeg. See Hubbell, Harvey, Inc.						
Operite. See Morse Co., Frank W.						
Pass & Seymour, Solvay Sta., Syracuse, N. Y.	f	s	p	P	L	F
Paulding, John L. New Bedford, Mass.	f	s	P			
Pen Tap. See Beaver Mfg. Co.						
Perkins. See Bryant Elec. Co.						
Pilot Radio & Tube Corp., 323 Berry, Brooklyn, N. Y.					L	
Pilotoggle. See Pilot Radio & Tube Corp.						
Pilotoggle. See Pilot Elec. Mfg. Co.						
Pullrite. See Morse, Frank W.						
Rodale Mfg. Co., 200 Hudson, New York	p					
Sears, Henry D., 80 Boylston, Boston	f	s	p	P	R	L F
Smith & Co., T. C., 3915 Powelton Ave., Philadelphia, Pa.				P		
Snapit. See Marks Products Co.						
Spartan. See Bryant Elec. Co.						
Standard Elec. Mfg. Co., 941 Wrightwood Ave., Chicago, Ill.	f			P	R	L
Trigle. See Bryant Elec. Co.						
Tumboller. See Hart & Hegeman.						
Twi-Lite. See McGill Mfg. Co.						
United States Elec. Mfg. Corp., 222 W. 114th, New York, N. Y.	f					
Victor. See Keil & Son, Francis						
Washington. See Gaynor Electric Co.						
Weber. See Sears, Henry D.						
Werkrite. See Morse, Frank W.						
Yankee. See Bryant Elec. Co.						

SWITCHES, Snap; Heavy Duty
Heavy duty rotary snap switches for Electric Range and Small Motor Control.
Arrow Elec. Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Bryant Electric Co., Bridgeport, Conn.
Diamond H. See Hart Mfg. Co.
Domestic Electric Co., 7723 St. Clair Ave., Cleveland, Ohio.

Now is the time to learn about G-E Glyptal lacquers

THE number of operations required to finish metal surfaces can be reduced by two if G-E GLYPTAL lacquers are utilized. Priming and sizing are not required, because the lacquers themselves function in both capacities. Moreover, G-E No. 1451 filler, recommended for use with GLYPTAL lacquers, possesses priming characteristics. This represents a considerable saving in time and money where metal products are finished on a large scale.

Remember that G-E GLYPTAL lacquers stick to all surfaces, including even galvanized iron and aluminum, with an unexcelled tenacity. A short bake somewhat intensifies this and their other exceptional qualities.

G-E GLYPTAL lacquers are now available in five colors: red, blue, green, brown, and aluminum—other colors to follow. Essentially, all afford the same distinctive advantages. Besides preventing rust, they resist alkalies, weak acids, salt spray, mineral oils, gasoline, and kerosene; they have high dielectric strength; and they stand extremely high temperatures without discoloration.

G-E GLYPTAL lacquers are applied by spraying, dipping, or brushing; air-dry quickly; and form smooth, tough, yet flexible finishes. Let the G-E Merchandise Distributor nearest you explain more about G-E GLYPTAL lacquers. If you prefer, fill in and mail the coupon.

WRITE FOR *test strip and folder*

Merchandise Department,
General Electric Company,
Bridgeport, Conn.
Gentlemen:

I wish to make my own experiments Please send the G-E GLYPTAL lacquer test strip and more detailed information about these new protective finishes.

_____

_____

Section I-2311 _____

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GENERAL ELECTRIC

GLYPTAL LACQUERS

REG. U.S. PAT. OFF.

SWITCHES, Snap—Continued
General Electric Co., Section W-234, Merchandise Dept., Bridgeport, Conn.
Hart Mfg. Co., Hartford, Conn.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.

SWITCHES, Storage Battery; Automatic Disconnecting

Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Penn Electric Switch Co., Des Moines, Ia.
Radiolec. See Cutler-Hammer Mfg. Co.

SWITCHES, Tank

Blackburn-Smith Corp., 25 W. 45th, New York, N. Y.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Electrical Repair Co., 240 W. 25th, New York, N. Y.
General Electric Co., Schenectady, N. Y.
Industrial Controller Div. of Square D Co., S. Pierce & Hanover Sts., Milwaukee, Wis.
Leader-Trabern Products Co., Decatur, Ill.
Ostrander Elec. Wks., W. R., 911 Atlantic Ave., Brooklyn.
Penn Elec. Switch Co., 20th & Walnut, Des Moines, Ia.
Sundh Elec. Co., Parkhurst St. at Ave. C, Newark, N. J.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

SWITCHES, Time (Automatic Clock Operated Switches)

Anderson Mfg. Co., Albert & J. M., 289 A, Boston, Mass.
Astrachron. See Gem Engineering Co.
Automatic Elec. Heater Co., 1505 Race, Philadelphia, Pa.
Automatic Elec. Mfg. Co., Mankato, Minn.
Automatic Lighting Co., 831 Greenmount Ave., Baltimore.
Automatic Sprinkler Corp. of America, 910 B. of L. E. Bank Bldg., Cleveland, Ohio.
Automatic Timer Co., 1841 Euclid Ave., Cleveland, O.
Berry, A. Hall, 73 Murray, New York, N. Y.
Brown & Pengilly, Inc., 1264 Folsom, San Francisco, Cal.
Buckeye Time Switches, Inc., 1557 St. Clair Ave., Cleveland, O.
Cackle. See Berry A. Hall.
Campbell Electric Mfg. Co., 15 Stewart, Lynn, Mass.
Clark. See Automatic Heater Co.
Con-tac-tor. See Absolute Con-tac-tor Corp.
Cramer & Co., R. W., 136 Liberty, New York, N. Y.
Eureka Tool & Machine Co., 42 Walnut, Newark, N. J.
Frisch, Walter P., 104 Linden, Rochester, N. Y.
Gem Engineering Co., Hempstead, N. Y.
General Electric Co., Schenectady, N. Y.
Go-N-Set. See G. & S. Research Lab.
G. & S. Research Laboratory, 1269 Cochran Ave., Los Angeles, Cal.
Hart Mfg. Co., Hartford, Conn.
Hartford. See Berry A. Hall.
Horni Signal Mfg. Co., 290 Hudson, New York, N. Y.
Jewel. See Time Switch Sales & Service.
Knowles, W. E., 2369 Broadway, Oakland, Cal.
Kwixset. See Thompson Clock Co.
Lamp-Lighter. See Robbins & Myers Co.
Liberty Bell Mfg. Co., Minerva, Ohio.
Mercury Time Switch Co., Marine City, Mich.
Northwestern Clock Co., Omaha, Neb.
Ohio Time Switch Co., 1439 St. Clair Ave., Cleveland.
Paragon Elec. Co., 409 S. Dearborn, Chicago, Ill.
Racine. See Reliance Automatic Ltg. Co.
Radio Owl, 2269 E. 51st, Los Angeles, Cal.
Radio Switchman. See R-V Mfg. Co.
Reliance Automatic Ltg. Co., 1925 Meade, Racine, Wis.
Research Mfg. Laboratory, 1269 Cochran Ave., Los Angeles.
Robbins & Myers Co., Springfield, O.
Rose Safety Switch Corp., 1 E. 42nd, New York, N. Y.
R-V Mfg. Co., Marshfield, Mass.
Sauter. See Cramer & Co.
States Co., Hartford, Conn.
Stromberg Electric Co., 223 W. Erie, Chicago, Ill.
Thompson Clock Co., H. C., Bristol, Conn.
Time Switch Sales & Service, 1841 Euclid Ave., Cleveland.
Tork Clocks, Inc., 12 E. 41st, New York, N. Y.
Walser Automatic Timer Co., 342 Madison Ave., New York.
Zenith Elec. Co., 537 S. Dearborn, Chicago, Ill.

TACHOMETERS

Speed Indicators, Speedometers, Revolution Counters.
Biddle, James G., 1211 Arch, Philadelphia, Pa.
Brown Instrument Co., Wayne & Windrim, Philadelphia.
Comet Elec. Co., 47 Union Trust Bldg., Indianapolis, Ind.
Durant Mfg. Co., 655 Buffum, Milwaukee, Wis.
Electric Tachometer Corp., Spring Garden & Broad St., Philadelphia, Pa.
Holtzer-Cabot Elec. Co., Boston, Mass.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.
Productimeter. See Durant Mfg. Co.
Standco. See Sticht & Co.
Sticht & Co., H. H., 13 Park Row, New York, N. Y.
Veeder Mfg. Co., 14 Sargeant, Hartford, Conn.
Weston Elect. Instrument Co., 582 Frelinghuysen Ave., Newark, N. J.
Zernickow Co., O., 15 Park Row, New York, N. Y.

TAGS, Cable; Pole and Battery

American Radio Hardware Co., 135 Grand, New York, N. Y. (Battery Lead Tags.)
Benedict Mfg. Co., East Syracuse, N. Y.
Brecklin Underground Elec'l Mfg. Co., Glenside, Pa.
Crowe Name Plate & Mfg. Co., 1749 Grace, Chicago, Ill.
Grammes & Sons, Inc., L. F., Allentown, Pa.
International Tag Co., 319 N. Whipple, Chicago, Ill.
Matthews & Co., Jas. H., 3942 Forbes, Pittsburgh, Pa.
Premax Products, Inc., 230 Tenth, Niagara Falls, N. Y.
Viking Tool & Machine Co., 745 65th, Brooklyn, N. Y.
Waterbury Button & Moulding Co. Waterbury, Conn.

TAGS, Shipping

Campbell Paper Box Co., South Bend, Ind.
International Tag Co., 319 W. Whipple, Chicago, Ill.

TAMPING TOOLS, COIL. See Tools, Commutator Truing.
TANK SWITCHES. See Switches, Tank.
TANKS, TINNING. See Wire Manufacturing Machines.

TAPE, Asbestos

American Asbestos Co., Norristown, Pa.
Asbestos Fibre Spinning Co., North Wales, Pa.
Ferodo & Asbestos, Inc., New Brunswick, N. J.
General Asbestos & Rubber Co., Charleston, S. C.
Johns-Manville Corp., New York, N. Y.
Matthews & Co., Jas. H., 3942 Forbes, Pittsburgh, Pa.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Niagrite. See Johns-Manville, Inc.
Shield Brand. See Mitchell-Rand Mfg. Co.

TAPE, Cotton, Linen, Silk;

Tape, Sleeving, Webbing.
Alfalfa. See Burrell Belting Co.
Anchor Webbing Co., 300 Brook, Pawtucket, R. I. (Cotton, silk).
Awabco. See Anchor Webbing Co.
ermaline See Burrell Belting Co.
Burrell Belting Co., 413 S. Hermitage Ave., Chicago, Ill.
Eagle. See Sidebotham, Inc., John.
General Electric Co., Schenectady, N. Y.
Gilmer Co., L. H., Cottman & Keystone Sts. (Tacony), Philadelphia, Pa.
Hope Webbing Co., 1005 Main, Providence, R. I.
Krout & Fite Mfg. Co., Allegheny Ave. & Emerald Philadelphia, Pa.

Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Pearce Co., R. T., Covington, Ky.
Shield Brand. See Mitchell-Rand Mfg. Co.
Sidebotham, Inc., John, 4317 Griscom, Philadelphia, Pa.
Smith Belting Co. (Germantown), Philadelphia, Pa.
Superfine. See Windsor Webbing Co.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Windsor Webbing Co., Pawtucket, R. I.
Worcester Braiding Co., 34 Southbridge, Worcester, Mass.

TAPE, Mica

Chicago Mica Co., 345 Campbell, Valparaiso, Ind.
Mica Insulator Co., 200 Varick, New York, N. Y.
Mica Mfg. Co., 135 Johnson, Brooklyn, N. Y.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

TAPE, Rubber and Friction

Ackerman. See Ackurate Rubber Co.
Ackurate Rubber Co., 25 Beaver St., New York, N. Y.
Adamson & Co., Joseph, Columbia and Germantown Aves Philadelphia, Pa.
Adhere. See Westinghouse Elec. & Mfg. Co.
Alpha. See Johns-Manville, Inc.
Amazon. See Graybar Elec. Co.
Appleton Rubber Co., Franklin, Mass.
Black Diamond. See Dunton Co., M. W.
Boston Woven Hose & Rubber Co., Boston, Mass.
Brooklyn. See Johns-Manville, Inc.
Bull-Dog. See Boston Woven Hose & Rubber Co.
Candee. See Ackurate Rubber Co.
Canfield Rubber Co., Bridgeport, Conn.
Canton. See Plymouth Rubber Co.
Clifton. See Clifton Mfg. Co.
Clifton Mfg. Co., 65 Brookside Ave., Boston 30, Mass.
Competition. See New York Insulated Wire Co.
Double-Wear. See Dryden Rubber Co.
Dryden Rubber Co., 1014 S. Kildare Ave., Chicago, Ill.
Dundee, A. & B. See Okonite Co.
Dunton Co., M. W., 670 Eddy St., Providence, R. I.
Dutch-Brand. See Van Cleef Bros.
Elkhart Rubber Wks., Elkhart, Ind.
Firestone Tire & Rubber Co., Akron, O.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Graybar Elec. Co., Graybar Bldg., Lexington Ave. & 43rd St., New York, N. Y.
Grimshaw. See New York Insulated Wire Co.
Griptite. See Canfield Rubber Co.
Holfast Rubber Co., Atlanta, Ga.
Hoidtite. See United States Rubber Co.
Hydro-Proof. See Elkhart Rubber Wks.
Imperial Rubber Co., 220 Broadway, New York N. Y.
Impervo. See Canfield Rubber Co.
Irco. See Imperial Rubber Co.
Johns-Manville Corp., New York, N. Y.
Jomanco. See Johns-Manville, Inc.
Kerite Ins. Wire & Cable Co., 30 Church, New York, N. Y.
Manson. See Okonite Co.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
New York Insulated Wire Co., 114 Liberty, New York, N. Y.
Okonite Co., Passaic, N. J.
O. K. See Appleton Rubber Co.
P. & B. See Ruberoid Co.
Paratex. See Appleton Rubber Co.
Paruco. See Passaic Rubber Co.
Passaic Rubber Co., Clifton, N. J.
Plymouth Rubber Co., 1400 Revere, Canton, Mass.
Red-X. St. Louis Rubber Cement Co.
Rello. See United States Rubber Co.
Ruberoid Co., 95 Madison Ave., New York, N. Y.
S. I. See Superior Insulating Tape Co.
Sitco. See Superior Insulation Tape Co.
Slipknot. See Plymouth Rubber Co.
Star. See Sullivan & Sons Mfg. Co., J.
Sticks. See Graybar Elec. Co.
Stirwell. See Clifton Mfg. Co.
Sullivan & Sons Mfg. Co., J., 2234 N. 9th, Philadelphia, Pa.
Superior Insulating Tape Co., 3044 Lambdin Ave., St. Louis.
2-Plex. See Holfast Rubber Co.
U. S. See United States Rubber Co.
United States Rubber Co., 1790 Broadway, New York, N. Y.
Usco. See United States Rubber Co.
Van Cleef Bros., 7722 Woodlawn Ave., Chicago.
Victor. See Graybar Elec. Co.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

TAPE, Varnished Fabric

Acme Wire Co., New Haven, Conn.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Irvington Varnish & Insulator Co., Irvington, N. J.
Mica Insulator Co., 200 Varick, New York, N. Y.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
New Jersey Wood Finishing Co., Woodbridge, N. J.
Radiotape. See Respro, Inc.
Respro, Inc., Wellington Ave. (Auburn), Providence, R. I.
Shield Brand. See Mitchell-Rand Mfg. Co.
Sleo. See Standard Insulator Co.
Standard Insulation Co., East Rutherford, N. J.
Voltape. See Respro, Inc.

TAPING MACHINES, Coil

Chapman Electric Works, P. E., 1820 Chouteau Ave., St. Louis, Mo.
Columbia Machine Works & Malleable Iron Co., Atlantic Ave. and Chestnut St., Brooklyn, N. Y.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Griswold Machine Co., George, New Haven, Conn.
Ridlon Company, Frank, Boston, Mass.
Segur. See Electric Service Supplies Co.

TAPING MACHINES, Wire

American Insulating Machinery Co., 519 Huntington Ave. Philadelphia, Pa.
Wire Machinery Corp. of Am., New Haven, Conn.

TAPS. See Stocks, Dies and Reamers.
TENSION DEVICES, Coil Wire. See Racks, Wire Reel

TENSION MACHINES, Band Wire

Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Peerless. See Electric Service Supplies Co.

TERMINALS AND CONNECTORS

Low Tension, Secondary Terminals and Connectors.
All-in-One. See Ohio Parts Co.
Barcy-Nicholson Co., 2801 Fort, W., Detroit, Mich.
Bassett Metal Goods Co., Derby, Conn. (General Selling Agent, Hatheway & Co., 16 Hudson, New York, N. Y.)
Burndy-Rogers Co., Boston, Mass.
Cabelug. See Jones, Howard B.
Clark Metal Products, 490 Hancock Ave., Bridgeport.

THERMOSTATIC METAL
For Low and High Temperatures
Our No. 1800 metal for temperatures up to 450° F.
Our No. 2800 metal for temperatures up to 1500° F.
W. M. CHACE VALVE COMPANY
1600 Beard Avenue, Detroit, Mich.

Dixie Supply Co., 91 7th Ave., New York.
Double Grip. See Pons, Eugene
Eagle Elec. Mfg. Co., 59 Hall, Brooklyn, N. Y.
Electron. See Bassett Metal Goods Co.
Fahnestock Elec. Co., East Ave. and 8th, Long Island City, N. Y.
Grammes & Sons, Inc., L. F., Allentown, Pa.
Ideal Clamp Mfg. Co., 198 Bradford, Brooklyn, N. Y.
Jones, Howard B., 2226 Wabansia, Chicago, Ill.
K. E. M. See Kulier Elec. Mfg. Co.
Kulier Elec. Mfg. Co., 575 Pierce Ave., Long Island City.
Morse Co., Frank W., Boston, Mass.
Nu-Way Snap. See Hatheway Mfg. Co.
Ohio Parts Co., 3301 Colerain Ave., Cincinnati, O.
Orum, S. R. M., 503 N. 11th, Philadelphia, Pa.
Patton-MacGuyer Co., Providence, R. I.
Pons, Eugene, 927 Campbell Ave., Schenectady, N. Y.
Petersen Co., 7 Beverly, Providence, R. I.
Rajah Co., Bloomfield, N. J.
Salem Elec'l Supply Co., Salem, Mass.
Sherman Mfg. Co., H. B., Battle Creek, Mich.
Shure. See Burton-Rogers Co.
Tinkerbox. See Weber Elec. Wks.
Waterbury Button & Moulding Co., Waterbury, Conn.
Weber Elec. Wks., Brooklyn Sts., Cleveland, O.
Wolverine Tube Co., 1431 Central Ave., Detroit, Mich.
Zierick Machine Wks., F. R., 6 Howard, New York.

TEST BENCHES, Armature

Allen Electric & Equipment Co., Kalamazoo, Michigan.
Burton & Rogers Co., Boston, Mass.
Cowie Electric Co., E. S., 1816 McGee, Kansas City, Mo.
Electric Machine Corp., 529 S. N. J., Indianapolis, Ind.
Hobart Bros. Co., Troy, Ohio.
Marshall Elec. Co., Elkhart, Ind.
Miho Company, 717 Sycamore, Cincinnati, Ohio.
North East Electric Co., Rochester, N. Y.
Pence & Son, H. O., San Luis Obispo, Cal.
Weidenhoff, Joseph, 4352 W. Roosevelt Road, Chicago, Ill.

TESTING INSTRUMENTS. See Instruments.

TESTERS, Coil

(Includes Armature Growlers, trouble shooters, and other portable testing devices). See also Instruments
Ace. See Weidenhoff, Joseph.
Allen-Bradley Co., 494 Reed, Milwaukee, Wis.
Allen Electric & Equipment Co., Kalamazoo, Michigan.
Ankenbrandt, J. J., 2140 Wakeman, Toledo, Ohio.
Armeter. See Chapman Electric Works, P. E.
Bartlett Electric Products Co., Goshen, Ind. (Storage Battery).
Batt-O-Meter. See Indiana Mfg. & Elec. Co., also Case Elec.
Burton & Rogers Co., 857 Boylston, Boston, Mass.
Case Elec. Co., Marion, Ind.
Century Electrical Co., 102 Randall Ave., Syracuse, N. Y.
Chapman Elec'l Works, P. E., 1820 Chouteau Ave., St. Louis, Mo
Colpin Corp., 6110 S. Main, Los Angeles, Cal.
Columbia. See Weidenhoff, Joseph.
Comparometer Co., New Ulm, Minn.
Cowie Electric Co., E. S., 1816 McGee, Kansas City, Mo.
Economy. See Weidenhoff, Joseph.
Electric Controller & Mfg. Co., 2700 E. 79th, Cleveland.
Electric Machine Corp., 529 S. N. J., Indianapolis, Ind.
Electrotest. See Comparometer Company.
Elmco. See Electric Machine Corp.
Ev-Ri-Test. See Weidenhoff, Joseph.
Ga-Jit. See General Instrument Corp.
General Instrument Corp., 225 Varick, New York, N. Y.
Herald Elec. Co., 29 East End Ave., New York, N. Y.
Hobart Bros. Co., Troy, Ohio.
Ideal. See Ankenbrandt, J. J.
Indiana Mfg. & Electric Co., Marion, Indiana.
Kietzman Electrical Mfg. Co., 234 N. Central, Gilman, Ill.
Leich Electric Co., Genoa, Ill.
Lundin Electric Machine Co., 10 Thacher, Boston, Mass.
Mallory Electric Co., Factories Bldg., Toledo, Ohio.
Marshall Elec. Co., Elkhart, Ind.
Miho Company, 717 Sycamore, Cincinnati, Ohio.
North East Electric Co., Rochester, N. Y.
Oman, David W., 43 Royalstone Ave., Minneapolis, Minn.
Paneltest. See Allen Elec. & Equip. Co.
Portometer. See Allen Elec. & Equip. Co.
Portostat. See Allen Elec. & Equip. Co.
Presto. See Metal Specialties Mfg. Co.
Reliable Parts Mfg. Co., Wellington, Ohio.
Rex Batrystat. See Bartlett Products Co.
Scout. See Leich Electric Company.
Serwell Sales Corp., 1749 N. Winchester Ave., Chicago, Ill.
Test-All. See Colpin Corp.
Test-O-Meter. See Weidenhoff, Joseph.
Test-Rite. See Colpin Corp.
Victory. See Weidenhoff, Joseph.
Weidenhoff, Joseph, 4352 W. Roosevelt Rd., Chicago, Ill.

TESTING LABORATORIES

Baker & Co., Inc., 54 Austin, Newark, N. J.
Elec'l Testing Laboratories, 80th St. and East End Ave., New York, N. Y.
National Elec'l Inst. Co., 162 Sidney, Cambridge, Mass.
New York Testing Laboratories, 80 Washington, New York.
Rubicon Co., 29 N. Sixth, Philadelphia, Pa.
THERMO JUNCTIONS. See Instruments, Laboratory Standard

THERMOSTATIC METAL

Baker & Co., Inc., 54 Austin, Newark, N. J.
Chace Valve Co., W. M., 1600 Beard Ave., Detroit, Mich.
Coffin Mfg. Co., B. F., 30 Court, Newark, N. J.
Cook Plate Co., Edw. N., 70 Ship, Providence, R. I.
General Plate Co., Attleboro, Mass.
Improved Seamless Wire Co., 775 Eddy, Providence, R. I.
Interstate Products Corp., 29 Commercial, Newark, N. J.
Venbur. See Coffin Mfg. Co., B. F.
Wilco. See H. A. Wilson Co.
Wilson Co., H. A., Newark, N. J.

THERMOSTATS

American Thermostat Co., 226 Jeliff Ave., Newark, N. J.
Automatic Appliance Co., Jackson, Mich.
Bak-Rite. See Electric Appliance Mfg. Co.
Bishop & Babcock Sales Co., 4901 Hamilton Ave., N. E., Cleveland, O.
Boston Machine Wks. Co., 7 Willow, Lynn, Mass.
Brown. See Electric Automatic Appliance Co.
Brown Instrument Co., Wayne & Windrim, Philadelphia, Pa.
Burke Controller Co., 360 Lexington Ave., New York, N. Y.
Cobb Elec. Appliance Co., 100 Massachusetts Ave., Boston.
Cramblett Engineering Div. of Time-O-Stat Controls Co., 286 Milwaukee, Milwaukee, Wis.
Coffin Mfg. Co., B. F., 30 Court, Newark, N. J.
Diamond H. See Hart Mfg. Co.
Electric Automatic Appliance Co., Denver, Colo.
Electric Heat Control Co., 5902 Carnegie Ave., Cleveland, O.
Electric Maid. See Hankscraft Co.
Fabrice Thermostatic Control Co., 4750 Sheridan Rd., Chicago, Ill.
Freas Thermo-Electric Co., 1206 S. Grove, Irvington, N. J.
Globe Mfg. Co., Battle Creek, Mich.
Hankscraft Co., 615 E. Washington, Madison, Wis.
Hart Mfg. Co., Hartford, Conn.
Hi-Lo. See Boston Machine Wks. Co.
Hynes & Cox Elec. Corp., 406 N. Pearl, Albany, N. Y.
Interstate Products Corp., 29 Commercial, Newark, N. J.

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THERMOSTATS—Continued
King. See Electric Heat Control Co.
Klixon. Set Westinghouse Electric & Mfg. Co.
Manhattan Elecl. Supply Co., 510 Sixth Ave., New York.
Marvel. See American Thermostat Co.
Mercoid Corp., 564 W. Adams, Chicago, Ill.
Moeller, A. E., 261 Sumpter, Brooklyn, N. Y.
Midget. See Coffin Mfg. Co., B. F.
National Steel Construction Co., 425 Fountenac, Seattle Wash.
Pyratherm. See Federal Gauge Co.
Safety Regulator Co., 529 S. Mathews, Los Angeles, Cal
Savutime Devices, Inc., 88 Manhattan, Rochester, N. Y
Struthers Dunn, Inc., 136 N. Juniper, Philadelphia, Pa.
Standard Thermometer Co., 65 Shirley, Boston 19, Mass
Tagliabue Mfg. Co., C. J., 18 33rd, Brooklyn, N. Y.
Teepie Co., L. R., 540 E. 9th, Portland, Ore.
Thermolectric. See Bishop & Babcock Sales Co.
Time-O-Stat Controls Co., Elkhart, Ind.
Trent Co., Harold E., 439 N. 12th, Philadelphia, Pa.
Visaflame. See Mercoid Corp.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wilcolator Co., Newark, N. J.

TIGHTENERS, Commutator

Elmes Engineering Works, Chas. F., 230 N. Morgan, Chicago, Ill.
TIME SWITCHES. See Switches, Time.

TIN FOIL

Lehmaier, Schwartz & Co., 521 W. 25th, New York, N. Y.
United States Foil Co., 30th & Grand Sts., Louisville, Ky.
TINNING TANKS, WIRE. See Wire Manufacturing Machines.
TINSEL. See Wire, Insulated.

TINSEL, Cord and Thread

Belden Mfg. Co., 2310 B S. Western Ave., Chicago, Ill.
Diamond Braiding Mills, Chicago Heights, Chicago, Ill.
Frank & Co., M. J., 15 W. 39th St., New York, N. Y.
Hy-Sil Mfg. Co., Revere, Mass.
Kilo Co., 2 E. 23rd, New York, N. Y.
Koelle, Frederick C., Real Estate Trust Bldg., Philadelphia.
Lees Mfg. Co., 320 Broadway, New York, N. Y.
Montgomery Co., J. R., Windsor Locks, Conn.
Rockbestos Products Corp., Nicoll & Canner, New Haven, Ct.
Springfield Wire & Tinsel Co., Springfield, Mass.
Taft Co., R. C., 174 N. Franklin, Chicago, Ill.

TIPS, Cord

Duro. See McEvoy, C. H.
McEvoy, C. H., 430 Broadway, Lowell, Mass.
National Acme Mfg. Co., 7500 Stanton Ave., Cleveland, O.
Norden & Co., S. 180 S. Water, Providence, R. I.
Rome Wire Co., Div. of General Cable Corp., Rome, N. Y.
Waterbury Brass Goods Corp., Waterbury, Conn.
TOOLS, Commutator Slotting. See Slotting Machines & Tools, Commutator.

TOOLS, Coil Tamping

Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.

TOOLS, Commutator Truing

Acme. See Green Equipment Corp.
Allen Elec. & Equipment Co., N. Pitcher St., Kalamazoo, Mich.
Binghamton Flexible Shaft Co., Binghamton, N. Y.
Central Mfg. Co., Fairfield, Ia.
Green Equipment Corp., Monadnock Block, Chicago, Ill.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Imperial. See Martindale Elec. Co.
Jordan Bros., 74 Beekman, New York, N. Y.
Martindale Elec. Co., 1262 W. Fourth, Cleveland, Ohio.

TOOLS, Storage Battery

Battery Equipment & Supply Co., 7530 Greenwood Ave., Chicago, Ill. Burning Racks, Battery Trucks, Plate Pressers, Mallets, Lead Burners and Strainers.
Battery Parts Co., Inc., Wilkinsburg, Pa. (Leads.)
Battery Tools Co., 29 Willow, Montclair, N. J.
Besco. See Battery Equipment & Supply Co.
Bobbett Elec. Mfg. Co., 811 E. 43rd St., Chicago, Ill. (Knife Heaters.)
Canedy-Otto Mfg. Co., 1816 McGee, Chicago Heights, Ill. (Floor Vises.)
General Elec. Co., Schenectady. (Lead Burning Outfits.)
Heet-A-Knife. See Op-al Elec. & Mfg. Co.
Ohio Parts Co., 3301 Colerain Ave., Cincinnati. (Terminals.)
Op-al Elec. & Mfg. Co., 1057 E. 30th St., Indianapolis, Ind. (Knife Heaters.)
Orum, S. R. M., 503 N. 11th, Philadelphia, Pa. (Pillar Post Sleeves, Tongs, Reamers, Strap Punches, Terminal Pullers, Steamers, Racks or Stands, Terminal Post Shapers, Battery Analyzer, Post Sealing Machine, Plate Burning Press, Press and Stands.)
Pyratip. See General Elec. Co.
Reliable Parts Mfg. Co., Wellington, O. (Steamer and Still, Filler, Separator Cutter, Clips, Carrier, Post Cutter, Terminal and Cell Puller.)
Thompson Mfg. Co., Meadville, Pa. (Reamers, Terminal Post Pullers, Pressing Tongs.)

TORCHES AND FURNACES

Acetylene, Alcohol, Gasoline, Kerosene.
Bernz Co., Otto, Newark, N. J.
Clayton & Lambert Mfg. Co., Detroit, Mich.
Dreadnaught. See Wall Mfg. Supply Co.
Klein & Sons, Mathias, Chicago, Ill.
McGill Mfg. Co., Valparaiso, Ind.
Staysallte. See Klein & Sons, Mathias.
TORPEDO Cord. See Twine.
TORSION BALANCES. See Instruments, Laboratory Standard

TRANSFORMERS

Radio. See Radio Circuit Components.
Gas Tube Sign. See Transformers, Oil Burner.
Oil Burner Ignition. See Transformers, Low & Intermediate Voltage.

TRANSFORMERS, Low and Intermediate Voltage

For Oil Burners, Gas Tube Signs, and other special purposes.
American Bosch Magneto Corp., Springfield, Mass.
American Transformer Co., Newark, N. J.
Campbell Elec. Mfg. Co., Lynn, Mass.
Dongan Elec. Mfg. Co., 2985 Franklin, Detroit, Mich.
General Electric Co. (Merchandise Dept.), Bridgeport, Conn.
Jefferson Electric Co., 1500 S. Laflin, Chicago, Ill.
K-W Ignition Corp., 2811 Chester Ave., Cleveland, Ohio.
Manhattan Elect. Supply Co., 510 Sixth Ave., New York.
Sorgel Electric Co., 89 W. Water, Milwaukee, Wis.
Standard Transformer Co., Warren, O.
Thordarson Elec. Mfg. Co., Huron & Kingsbury Sts., Chicago, Ill.
Uptigraff Mfg. Co., R. E., First National Bank Bldg., Pittsburgh, Pa.
Ward Leonard Elec. Co., Mt. Vernon, N. Y.
Webster Electric Co., Racine, Wis.
TRANSMISSION DRIVES. See Chain, Transmission.

TRANSMITTERS, Power

Controller drive giving a variety of speeds for use in connection with coil taping machines.

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THORDARSON ELECTRIC MFG. CO.
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Huron and Kingsbury Sts., Chicago, Ill.

Electric Service Supplies Co., 17th & Cambria Sts. Philadelphia, Pa.
Segur. See Electric Service Supplies Co.
TROUBLE FINDERS. See Instruments, Portable and Switchboard; also Testers, Coil.
TRUCKS. Armature. See Lifts, Armature.

TRUCKS, Factory Steel

Angle Steel Stool Co., Plainwell, Mich.
TRUING Devices, Commutator. See Tools, Commutator.
TUBE (Tubes) (Tubing) Adapters. See Radio Receiver Parts.
Aluminum. See Aluminum.
Brass. See Tubing, Brass.
Condenser. See Tubing, Brass and Copper.
Copper. See Tubing, Brass.
Cutters. See Stocks, Dies, etc.
Fibre. See Fibre.
Fibre Candle. See Candles.
Mica. See Mica.
Paper. See Tubes, Paper.
Platinum. See Platinum.
Pyrometer. See Cores, Resistance.
Refractory. See Cores, Resistance.
Radio. See Radio Vacuum Tubes.
Varnished Fabric. See Tubing, Varnished Fabric.

TUBES, Paper; Cores; Sleeves, Bushings

Cleveland Container Co., 10619 Berea Rd., Cleveland, O.
Climax Tube Co., Myatte, Conn.
Klimaxcore. See Climax Tube Co.
McCausland, J. E., 86 Valley, Providence, R. I.
Fairpoint Corp., New Bedford, Mass.
Paper Tube Co., 1718 N. Damen Ave., Chicago, Ill.
Reliable Elec. Co., 3145 Carroll Ave., Chicago, Ill.
Remington Mfg. Co., 939 Barnum Ave., Bridgeport, Conn.
Standard Underground Cable Co., Div. of General Cable Corp., Pittsburgh, Pa.
Stone Paper Tube Co., 38 O. N. E., Washington, D. C.
Textile Tube Co., Fall River, Mass. (Paper Sleeves.)

TUBING, Brass and Copper

American Brass Co., Waterbury, Conn.
Anaconda. See American Brass Co.
Baltimore Tube Co., 1301 Wicomico, Baltimore, Md.
Bridgeport Brass Co., Bridgeport, Conn.
Bull Dog. See National Elec. Products Corp.
Chase Brass & Copper Co., Waterbury, Conn.
Conklin Brass & Copper Co., T. E., 54 Lafayette, New York.
Cook, Dunbar Smith Co., 85 Sprague, Providence, R. I.
Dallas Brass & Copper Co., 820 Orleans, Chicago, Ill.
French Mfg. Co., 128 Robbins, Waterbury, Conn.
Michigan Copper & Brass Co., 5851 W. Jefferson Ave., Detroit, Mich.
Mueller Brass Co., Port Huron, Mich.
National Copper & Smelting Co., 1395 Coltman Rd., Cleveland, O.
National Elec. Products Corp., Pittsburgh, Pa.
Randolph Clowes Co., Waterbury, Conn.
Rellom. See Mueller Brass Co.
Roberts Tube Works, 2500 Military Ave., Detroit, Mich.
Rome Brass & Copper Co., Rome, N. Y.
Rome Hollow Wire & Tube Co., Rome, N. Y.
Rome Turney Radiator Co., Rome, N. Y.
Scovill Mfg. Co., Waterbury, Conn.
Standard Underground Cable Co. (Div. of General Cable Corp.), Pittsburgh, Pa.
Summerill Tubing Co., Bridgeport, Pa.
Torrington Mfg. Co., Torrington, Conn.
United Wire & Supply Co., 1497 Elmwood Ave., Providence.
Wells Co., A. H., Watertown Ave., Waterbury, Conn.
Wolverine Tube Co., 1431 Central Ave., Detroit, Mich.

TUBING, Flexible Metallic

(Flexible Tubing.)
Almond Mfg. Co., T. R., Ashburnham, Mass.
American Metal Hose Co., Waterbury, Conn.
American Metal Moulding Co., 146 Colt St., Irvington, N. J.
Anaconda Wire & Cable Co., 25 Broadway, New York, N. Y.
Auto-Brassflex. See National Metal Elec. Products Corp.
Auto-Steelflex. See National Metal Elec. Products Corp.
Breeze Corp., Inc., 24 S. 6th, Newark, N. J.
Fischer Spring Co., Chas., 238 Kent Ave., Brooklyn, N. Y.
National Elec. Products Corp., 1110 Fulton Bldg., Pittsburgh, Pa.
Riflex. See United Metal Hose Co.
Sleeper & Hartley, Inc., Worcester, Mass.
Time-O-Stat Controls Co., Elkhart, Ind.
Titeflex Metal Hose Co., Newark, N. J.
Triangle Conduit Co., Dry Harbor Rd. and Cooper Ave., Brooklyn, N. Y.
United Metal Hose Co., 724 Garrison Ave., New York, N. Y.
White Dental Mfg. Co., S. S., 152 W. 42nd, New York.

TUBING, Rubber

Rubber Tubing for Insulating Wire in Instruments and Telegraph Signal Lines.
Canfield Rubber Co., 702 Railroad Ave., Bridgeport, Conn.
Eisler Electric Corp., 756 S. 13th, Newark, N. J.
Faultless Rubber Co., Ashland, O.
Forest City Rubber Co., 1276 Ontario, Cleveland, O.
Goodrich Rubber Co., B. F., Akron, O.
Rubber-Vac. See Eisler Electric Corp.
Tyler Rubber Co., Andover, Mass.
Vulcanized Rubber Co., 251 Fourth Ave., New York, N. Y.

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Alpha Wire Corp., 520 Broadway, New York, N. Y.
Brantley-Harris Mfg. Co., Conshohocken, Pa.
Brand & Co., William, 268 Fourth Ave., New York, N. Y.
Empire. See Mica Insulator Co.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Goodrich Rubber Co., B. F., Akron, O.
Insulated Duct & Cable Co., Stokes, Trenton, N. J.
Insuline Corp. of America, 78 Cortlandt, New York, N. Y.
Irvington Varnish & Insulator Co., Irvington, N. J.
Lee Tire & Rubber Co., Conshohocken, Pa.
Mica Insulator Co., 200 Varick, New York, N. Y.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Pearce Co., R. T., Covington, Ky. (Insulated Waxed Cotton.)
Turbo. See Brand & Co.
Varflex Corp., Rome, N. Y.
TURNED-UP BOXES AND CABINETS. See Cabinets, Sheet Steel
TURNING TOOLS, COMMUTATOR. See Tools, Commutator Truing

TWINE, Armature Winding; Torpedo Cord

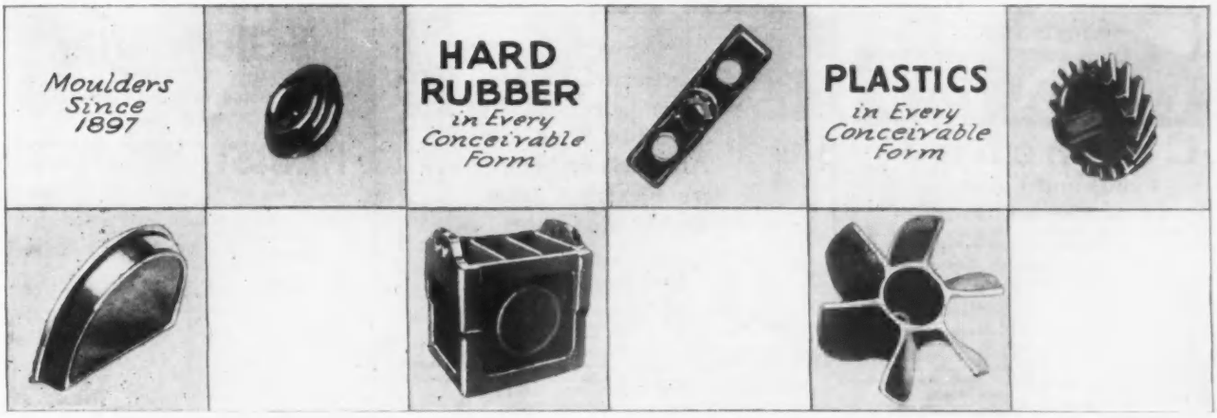
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Winne & Son, Frank W., 42 N. Front, Philadelphia, Pa.
UNDERCUTTERS, Mica. See Slotting Machines & Tools, Commutator.
UNITS, Refrigerator Condenser. See Condenser Units, Refrigerator.

UNITS, Rods and Grids, Resistance

Acme Elec. Heating Co., Dept. R, 1217 Washington, Boston.
Allen-Bradley Co., 494 Reed, Milwaukee, Wis.
Automatic Electric Heater Co., 1706 Race, Philadelphia, Pa.
Bradleyunit. See Allen Bradley Co.
Buffalo Products Co., Broome & Lafayette Sts., New York.
Burger, J. P., 1813 Columbus Rd., Cleveland, O.
Calrod. See Edison Elec. Appliance Co.
Chromalox. See Edwin L. Wiegand Co.
Clark Controller Co., 1146 E. 152nd, Cleveland, O.
Crown Coloring & Chemical Co., 33 W. 17th, New York.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Dalton Elec. Heating Co., 287 Bridge St., Salem, Mass.
Dalton-Marsh Co., 88 Holten, Danvers, Mass.
Daric Co., 35 E. 21st, New York, N. Y.
Di-El-Ite. See Wirt Co.
Dixon Crucible Co., Jos., Jersey City, N. J.
Dur-ristor. See Cutler-Hammer, Inc.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn, N. Y.
Edgerest. See Industrial Controller Div.
Edgewound. See Monitor Controller Co.
Edison Electric Appliance Co., 5618 W. Taylor, Chicago, Ill.
Elec. Controller & Mfg. Co., 2700 E. 79th, Cleveland, O.
Electro Thermal-Unit Co., 44 N. Fourth, Philadelphia, Pa.
Elemite. See Louthan Mfg. Co.
Erie Resistor Corp., 644 W. Twelfth, Erie, Pa.
Fits-All. See Eagle Elec. Mfg. Co.
Fitz-All. See Rodale Mfg. Co.
Fitz-Rite. See Rodale Mfg. Co.
Fix-All. See Witlow Elec. Mfg. Co.
F & M. See Hiram Marks Elec. Co.
General Electric Co., Schenectady, N. Y.
Globar Corp., Niagara Falls, N. Y.
Glo-Well. See Eagle Elec. Mfg. Co.
Gold Seal Elecl. Co. of Ohio, Inc., 250 Park Ave., New York, N. Y.
Hance-Parker Mfg. Co., 397 West Main, Meriden, Conn.
Hankscraft Co., 615 E. Washington, Madison, Wis. (Oven Heater Unit.)
Hardwick, Hindle, Inc., 122 Greenwich, New York, N. Y.
Hexwound. See Monitor Controller Co.
Industrial Controller Div. of Square D Co., S. Pierce & Hanover Sts., Milwaukee, Wis.
Industrial Heater Co., 300 Canal, New York, N. Y.
International Resistance Co., 2006 Chestnut, Philadelphia, Pa. (Radio Resistance.)
Krischer's Mfg. Co., 255 Calyer, Brooklyn.
Lautz Mfg. Co., 245 N. J. R. R. Ave., Newark, N. J.
Louthan Mfg. Co., East Liverpool, O.
Marks, Elec. Co., Hiram, 304 Woodward Ave., Detroit, Mich.
Monitor Edgewound. See Clark Controller Co.
Monitor Controller Co., 51 S. Gay, Baltimore, Md.
Nelco. See Nelson Electric Co.
Nelson Electric Co., Plant City, Fla.
Northern Electric Co., 2833 N. Western Ave., Chicago, Ill.
Ogden Mfg. Co., 3947 Armitage Ave., Chicago, Ill.
Ohmite Mfg. Co., 636 N. Albany Ave., Chicago, Ill.
Ohm-Spun. See States Co.
Op-al Elec. & Mfg. Co., 1057 W. 30th, Indianapolis, Ind.
Parker & Co., J. C., 407 Bulletin Bldg., Philadelphia, Pa.
Poloron Elec. Mfg. Co., 20 Bond, New York, N. Y.
Presto Products Co., 84 University Place, New York, N. Y.
Prometheus Elec. Corp., 358 W. 13th, New York, N. Y.
Pyrox. See Westinghouse Elec. & Mfg. Co.
Reben Elec. Mfg. Co., 2024 Gravesend Ave., Brooklyn, N. Y.
Remco. See Reben Elec. Mfg. Co.
Renuall. See Ogden Mfg. Co.
Repairall. See Waage Elec. Co.
Replaceall. See Waage Elec. Co.
Ribohm. See Ward Leonard Elec. Co.
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Rubicon Co., 29 N. Sixth, Philadelphia, Pa.
Sepco. See Automatic Electric Heater Co.
Smith & Co., T. C., 3915 Powelton Ave., Philadelphia, Pa.
Smoothwound. See Monitor Controller Co.
Snoco. See Snow & Co.
Snow & Co., E. W., Rochester, N. Y.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa
Super. See Northern Elec. Co.
United Metal Art Mfg. Co., 293 Wyckoff Ave., Brooklyn, N.Y.
Vitrohm. See Ward Leonard Elec. Co.
Waage Elec. Co., 5100 W. Ravenswood Ave., Chicago.
Ward Leonard Elec. Co., 31 South, Mt. Vernon, N. Y.
Warren Elec. Appliance Co., Warren, Pa.
Watlow Elec. Mfg. Co., 1320 N. 23rd, St. Louis, Mo.
Westinghouse Elec. & Mfg. Co., Mansfield, O.
Wiegand Co., Edwin L., 7500 Thomas Blvd., Pittsburgh, Pa.
Wirt Co., 5221 Greene, Philadelphia, Pa.
VACUUM CLEANER BAGS. See Bags, Vacuum Cleaner.
VACUUM DRYING & IMPREGNATING OVENS. See Ovens, Industrial.
VACUUM PUMPS. See Pumps, Vacuum.

VALVES, Electrically Operated

Asco. See Automatic Switch Co.
Automatic Switch Co., 154 Grand, New York.
Chapman Valve Mfg. Co., Indian Orchard, Mass.
Crane Co., 836 Michigan Ave., S., Chicago, Ill.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Electric Steam Radiator Co., 513 Stewart, Seattle, Wash.
Electric-Valve Mfg. Co., 68 Murray, New York, N. Y.
Fabrice Thermostatic Control Co., 4750 Sheridan Rd., Chicago, Ill.
Gas-Gard Co., 375 Main St., E., Rochester, N. Y. (Gas.)
General Electric Co., Schenectady, N. Y.
Golden-Anderson Valve Specialty Co., 1385 Fulton Bldg., Pittsburgh, Pa.
Lunkenheimer Co., Cincinnati, O.
Minneapolis-Honeywell Regulator Co., Fourth Ave. & 28th, Minneapolis, Minn.



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Time-O-Stat Controls Co., Elkhart, Ind.
Victor. See Lunkenheimer Co.
Zeco. See Zisch Engineering Corp.
Zisch Engineering Corp., 39 Avenue L, Newark, N. J. (Gas.)
VARNISH. See Paint, Varnish, Lacquer.
VARNISHED TAPE. See Tape, Varnished Fabric.
VARNISHED TUBING. See Tubing, Varnished Fabric.
VOLT BOXES. See Instruments, Laboratory Standard.
VOLTMETERS. See Instruments.
VULCANITE. See Rubber, Hard.

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Keystone. See Positive Lock Washer Co.
National Lock Washer Co., Newark, N. J.
Positive Lock Washer Co., Ave. A & Miller, Newark, N. J
Shakeproof Lockwasher Co., 2513 N. Keeler Ave., Chicago
St. Louis Malleable Casting Co., 7701 N. Conduit Ave., St. Louis, Mo.

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Chase Brass & Copper Co., Waterbury, Conn.
Chicago Nut Mfg. Co., 2513 Cullerton, Chicago, Ill.
Hubbard Spring Co., M. D., Pontiac, Mich.
Massachusetts Machine Shop, Inc., Boston, Mass.
New England Screw Co., Dept. A., 44 Farnsworth, Boston
Quadriga Mfg. Co., 213 W. Grand Ave., Chicago, Ill.
Wrought Washer Mfg. Co., 46 S. Bay, Milwaukee, Wis.
WATTMETERS. See Instruments.

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Junction Box, Potheads, Battery Tops, Bolt Head Holes.
Wax and Compound.....See S
Saturating and Finishing, Braided Wire, Impregnating Fabric and Paper.
Chatterton's Compound.....See C
Ackurate Rubber Co., 25 Beaver, New York, N. Y. W
Ajax. See Sherwin-Williams Co.
Asphalt Products Co., 6531 S. State, Chicago... S
Bishop Wire & Cable Corp., 420 E. 25th, New York, N. Y.....C
Biwax Corp., 206 S. La Salle, Chicago, Ill.... W S
Black Nego. See Williams Co., F. M.
Bulls-Eye. See Zinsser & Co.
Cablelene. See Vacuum Oil Co.
Candy & Co., 35th and Maplewood Ave., Chicago W S
Cerowax. See Vacuum Oil Co.
Clifton Mfg. Co., 65 Brookside Ave., Boston.....C
Cochrane Chemical Co., 432 Danforth Ave., Jersey City, N. J.....W S
Dolph Co., John C., 168 Emmet, Newark, N. J. W
Di Electric Puttie. See Ackurate Rubber Co.
Ever-Protect. See National Cable Compound Co
Flake White. See Williams Co., F. M.
General Electric Co., Bridgeport, Conn.....W
Geoge Co., P. A., 4153 Bingham Ave., St. Louis W
Globe Chemical Co., Murray Road & Big 4 R R St. Bernard, Cincinnati, O.....W
Golde Brown. See Williams Co., F. M
Great Lakes Thread & Yarn Co., Div. of General Cable Corp., 5133 Wesson Ave., Detroit... W
Hercules Powder Co., 975 Market, Wilmington, Del. (Wood Rosin).....S
Hexsulate. See Tar Products Corp.
Imco. See Great Lakes Thread & Yarn Co
India Red Seal. See Williams Co., F. M.
Insulatine Co., 1 Broadway, New York.....W
Insulation. See Vacuum Oil Co.
Knox & Morse Co., 80 Freeport, Boston, Mass..... W S
Leverite. See Mitchell-Rand Mfg. Co.
Lime Seal. See Mitchell-Rand Mfg. Co.
McGill Mfg. Co., Valparaiso, Ind.....C
Mineralac Elec. Co., 1045 Washington Blvd., Chicago, Ill.....W
Mitchell-Rand Mfg. Co., 19 Vesey, New York.... W S C
Mule-Hide. See Lehon Co.
National Cable Compound Co., Mitchell, Ind.... W
National Wax Co., 189 W. Madison, Chicago, Ill. .. S
Nu-Blac. See Star Porcelain Co.
Pax Flexo. See Williams Co., F. M.
Rubberseal. See Mitchell-Rand Mfg. Co.
Rub-Flexo. See Williams Co., F. M.
Seidner & Enequist, Inc., 86 Hausman, Brooklyn, N. Y.....W
Sherwin-Williams Co., Cleveland, O.....W C
Standard Varnish Wks., 433 4th Av., New York.. W
Standard Wax & Import Co., 110 E. 42nd, New York, N. Y.....W S
Star Porcelain Co., Trenton, N. J.....W C
Tacrite. See Seidner & Enequist, Inc
Tar Products Corp., Indiana Trust Bldg., Providence, R. I.
Trotter & Co., E. T., 576 Johnson Ave., Brooklyn, N. Y.....W S
Vacuum Oil Co., 61 Broadway, New York, N. Y. W
Warner-Quinlan Co., 2 Park Ave., New York, N. Y. C
Waverly Oil Wks., 54th and A. V. R. R., Pittsburgh, Pa.....S

Williams Co., F. M., 1238 Prospect Ave., Brooklyn, N. Y.
Zinsser & Co., 48 Vesey, New York, N. Y..... W
WEDGE DRIVERS. See Tools, Cummutator.
WELDS, Lamp Lead-in. See Filaments, Incandescent

WELDING AND CUTTING OUTFITS

Electric Arc, Spot, Butt and Seam Metal Welders and Metal Cutting Outfits.
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A. E. F. See American Electric Fusion Corp.
Agnew Electric Welder Co., Milford, Mich.
Allan Mfg. & Welding Co., Inc., 726 Washington, Buffalo
Almanc. See Allan Mfg. & Welding Co., Inc.
Alternarc. See Electric Arc Cutting & Welding Co.
American Elec. Fusion Corp., 2610 Diversey Ave., Chicago
Ames Co., 115 Ninth, Brooklyn, N. Y.
Burke Electric Co., Erie, Pa.
Cushing Mfg. Co., 5617 Pacific Blvd., Los Angeles, Cal.
Dwyer Machine Co., Lynn, Mass.
Economy Electric Products Co., 2400 Woodland Ave., Cleveland, O.
Eisler Electric Corp., 756 S. 13th, Newark, N. J.
Electric Arc Cutting & Welding Co., 156 Jelliff Ave., Newark, N. J.
Electric Welding Co. of America, 744 Court, Brooklyn, N. Y.
Electric Welding Machine Co., 1530 Larned, E., Detroit.
Farwest Electric Welder Co., 1107 Northlake Ave., Seattle.
Federal Machine & Welder Co., Dana Ave., Warren, O.
Fleet-Weld. See Lincoln Elec. Co.
Fusion Welding Corp., 10257 Torrence Ave., Chicago.
General Electric Co., Schenectady, N. Y.
General Engrg. & Supply Co., 160 5th Ave., New York, N. Y.
Gibb Welding Machines Co., Bay City, Mich.
Hansen. See Northwestern Mfg. Co.
Hollup Corp., C. H., 3333 W. 48th Place, Chicago, Ill.
Lincoln Electric Co., Coit Rd. and Kirby Ave., Cleveland.
Lundy Co., E. A., Fulton Bldg., Pittsburgh, Pa.
McAdams Co., J. C., New Britain, Conn.
Nigg Engineering Corp., Second St. & Covina Blvd., Covina, Cal.
Northwestern Mfg. Co., 480 Clinton, Milwaukee, Wis.
Owen Elec. Mfg. Co., Fayetteville, N. C.
Plastic Arc. See Wilson Welder & Metal Co.
Pyrotip. See General Elec. Co.
Quasi-Arc, Inc., 11 W. 42nd St., New York, N. Y.
Rhason Mfg. Co., 217 45th, Union City, N. J.
Ryerson & Son, Jos. T., 2558 W. 16th, Chicago, Ill.
Sellars Arc Welder Co., 1200 Fourth Ave., Seattle, Wash.
Seneca Electric Welder Corp., 5057 Woodward, Detroit, Mich.
Siemund Wenzel Electric Welding Co., 79 Hancock, Long Island City, N. Y.
Swift Elec. Welder Co., 2567 W. Grand Blvd., Detroit.
Taylor-Winfield Corp., Mahoning Ave., Warren, O.
Thompson Electric Welding Co., Lynn, Mass.
Una Welding & Bonding Co., 1615 Collamer Ave., Cleveland, O.
U. S. L. Battery Corp., Niagara Falls, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wilson Welder & Metal Co., Hoboken factory, Terminal Bldg., Hoboken, N. J.
Zeus. See Gibb Welding Machine Co.
WHEATSTONE BRIDGES. See Instruments, Laboratory Standard.

WICKS, Lubricating

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WINDERS

Armature & Field Coil. See Winding Machines, Armature & Field Coil.
Coil. See Winding Machines, Armature & Field Coil.
Electromagnet. See Winding Machines, Induction Coil.
Filament. See Machines, Lamp Making.
Induction Coil. See Winding Machines, Induction Coil.
Loop. See Winding Machines, Armature & Field Coil.

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Browning. See Mutual Foundry & Machine Co.
Chapman Electric Works, P. E., 1820 Chouteau Ave., St. Louis, Mo.
Columbia Machine Works & Malleable Iron Co., Atlantis Ave. & Chestnut St., Brooklyn, N. Y.
Comstock Mfg. Co., Wilkes-Barre, Pa.
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Handy. See Armature Coil Equipment Co., 2415 Forestdale Ave., Cleveland, Ohio.
Herald Electric Co., 29 East End Ave., New York, N. Y.
Hunsdorf, Wm., 2056 E. Fourth, Cleveland, O.
Liberty Starter Co., 271 Vinewood Ave., Detroit, Mich.
Line, W. C., 208 S. Geddes, Syracuse, N. Y.
Mutual Foundry & Machine Co., Atlanta, Ga.
Onan, David W., 43 Royalstone Ave., Minneapolis, Minn.
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Copper Clad. See Wire, Copper Clad.
Forms. See Forms, Wire.
Frames. See Forms, Wire.
Fuse. See Fuses and Fuse Wire.
Lamp & Tube Filament. See Filaments, Incandescent Lamp.
Magnet. See Wire, Insulated.
Molybdenum. See Molybdenum.
Phosphor Bronze. See Phosphor Bronze.
Platinum. See Platinum.
Radio Bus. See Wire, Bare.
Scrapers. See Strippers.
Strippers. See Strippers.
Tungsten. See Filament, Incandescent Lamp.

WIRE, Bare

Armature Banding.....See S
Copper Wire.....See C
Iron Wire.....See S
Phosphor Bronze.....See B
Radio Bus Wire.....See C
Resistance Wire.....See R
Steel Wire.....See S

Acme. See Alloy Metal Wire Co.
Alpha Wire Corp., 520 Broadway, New York.. C R
Advance. See Driver Harris Wire Co.
Alloy Metal Wire Co., Moore, Pa.....C R
American Copper Products Corp., 233 Broadway, New York, N. Y.....C R
American Electrical Works (Phillipsdale), Providence, R. I.....C
American Insulated Wire & Cable Co., Div. of General Cable Corp., 954 W. 21st, Chicago.... C S
American Steel & Wire Co., 208 S. La Salle.
Anaconda Wire & Cable Co., 25 Broadway, New York, N. Y.....C
Anylite Elec. Co., Fort Wayne, Ind.....C
Ballast. See Gilby Wire Co.
Baltimore Copper Mills (Div. of General Cable Corp.), Baltimore, Md.....C
Bassett Metal Goods Co., Derby, Conn. (General Sales Agent, Hatheway & Co., 16 Hudson, New York, N. Y.....C
Belden Mfg. Co., 2310B S. Western Ave., Chicago C S
Beldenite. See Belden Mfg. Co.
Bradford, Kyle & Co., Plymouth, Mass.....B
Braidite. See Cornish Wire Co.
Brenvar. See American Insulated Wire & Cable Co.
Bridgeport Brass Co., Bridgeport, Conn.....C
Calido. See Driver Harris Wire Co.
Chromel. See Hoskins Mfg. Co.
Chromic. See Murray-Harris Wire Co.
Climax. See Driver Harris Wire Co.
Comet. See Driver Harris Wire Co.
Comin. See Gilby Wire Co.
Cusk Plate Co., Edw. N., 70 Ship, Providence, R. I. C
Copel. See Hoskins Mfg. Co.
Copperweld Steel Co., Glassport, Pa.....C S
Cornish Wire Co., 30 Church, New York, N. Y.. C
Corwico. See Cornish Wire Co.
Crapo. See Indiana Steel & Wire Co.
Crescent Ins. Wire & Cable Co., Trenton, N. J.. C
Cupron. See Gilby Wire Co.
Darow Mfg. Co., 36 E. 20th, New York, N. Y.... C
Detroit Insulated Wire Co., Detroit, Mich..... C
1885. See Chicago Insulated Wire & Mfg. Co.
Driver Harris Wire Co., Harrison, N. J.....B
Electron. See Bassett Metal Goods Co.
Excelicier. See Branford Elec. Co.
Fullman Mfg. Co., 1309 Jefferson, Latrobe, Pa.....
Gilby Wire Co., Riverside Ave., Newark, N. J.....B
Goldmark Co., James, 83 Warren, New York.. C
Hope Webbing Co., Providence, R. I. (Braided Wire Tape).....C
Hoskins Mfg. Co., 4415 Lawton Ave., Detroit, Mich.....B
Hudson Wire Co., Ossining, N. Y.....C B
Ideal. See Driver Harris Wire Co.
Indiana Rubber & Insulated Wire Co., Jonesboro, Ind.....C S
Indiana Steel & Wire Co., Muncie, Ind. ..... S
Karma. See Driver Harris Wire Co.
Keystone. See Fullman Mfg. Co.
Lucero. See Driver Harris Wire Co.
Marion Insulated Wire & Rubber Co., Marion, Ind. C
Monex. See Standard Alloy Wire Co.
National-Harris Wire Co., 195 Verona Ave., Newark, N. J.....B
Nehring Electrical Works, De Kalb, Ill.....C
Nichrome. See Driver Harris Wire Co.
Novar. See Standard Alloy Wire Co.
Page Steel & Wire Co., Bridgeport, Conn.....S
Paranite. See Indiana Rubber & Insulated Wire Co.
Peerless. See Alloy Metal Wire Co.
Phillips Wire Co., Div. of General Cable Corp., Pawtucket, R. I.....C
Phono-Electric. See Bridgeport Brass Co.
Premier. See Alloy Metal Wire Co.

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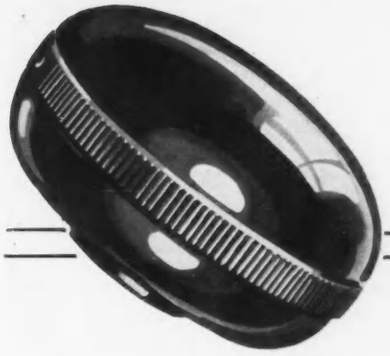

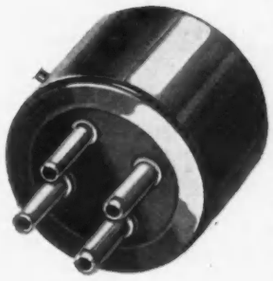

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CHAIRS

ROYAL METAL MFG. CO.

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WIRE, Bare—Continued

Providence Insulated Wire Co., Providence, R. I.. C . . . .
Race. See Rome Wire Co.
Revolute Wire Co., Hastings-on-Hudson, N. Y.... C . . . .
Rice Co., A. H., Pittsfield, Mass. ..... C . . . .
Roebling's Sons Co., John A., Trenton, N. J..... C . . S
Rome Wire Co., Div. of General Cable Co., Rome, N. Y. ..... C . . . .
Ross Wire Co., 69 Bath, Providence, R. I..... C . . . .
Seneca Wire & Mfg. Co., Fostoria, O. .... S
Silcrimp. See Valley Narrow Fabric Co.
Silectron. See Standard Alloy Wire Co.
Solar. See Gilby Wire Co.
Spurg Wire Co., J. A., Rome, N. Y..... C . . . .
Standard Alloy Wire Co., Elizabeth, N. J. .... R S
Standard Underground Cable Co. (Div. of General Cable Corp.), Pittsburgh, Pa. ..... C . . . .
Super-Insulated Wire Co., Plymouth, Mass. ..... C . . . .
Superior. See Alloy Metal Wire Co.
Talking Tape. See Hope Webbing Co.
Therlo. See Driver Harris Wire Co.
Tophet. See Gilby Wire Co.
Tru-Lay. See Page Steel & Wire Co.
Valley Narrow Fabric Co., Falls, R. I.
Wheeler Insulated Wire Co., Bridgeport, Conn.. C . . . .

WIRE, Copper Clad

Copperweld Steel Co., Rankin, Pa.
Standard Underground Cable Co., Div. of General Cable Corp., Pittsburgh, Pa.

WIRE SOLDER. See Solder, Bar and Wire.

WIRE DRAWING MACHINES

Drawing and Re-drawing Mill Equipment for Small Wires
American Insulating Machinery Co., 519 Huntington Ave., Philadelphia, Pa.
Sleeper-Hartley, Inc., Worcester, Mass.
Torrington Manufacturing Co., 70 Franklin, Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, Ohio.
Wire Machinery Corp. of Am., New Haven, Conn.

WIRE, Insulated

KEY

Annunciator, Office, Bell Wire....See A
Asbestos Covered Heater Cord.....See H
Asbestos Covered Magnet Wire....See M
Enameled Magnet Wire .....See M
Fixture Wire .....See R
Flexible Reinforced Heavy Duty Cord .....See F
Heater Cord .....See H
Ignition Cable .....See R
Lamp Cord .....See R
Magnet Wire .....See M
Rubber Covered Wire & Cable..See R
Stove Wire .....See H
Telephone Cord .....See T

A-A Wire Co. (Div. of General Cable Corp), 420 Lexington Ave., N. Y. C.. R . . . . . .
A-1 Brand. See American Insulated.
Acme Wire Co., New Haven, Conn. Enamaled Silk, Cotton .... M
Amelectric. See American Elec.
American Braiding Co., Holyoke, Mass. R . . . . . .
American Brand. See American Insulated Wire & Cable Co.
American Copper Products Corp., 233 Broadway, New York, N. Y..... . . . . . .
American Electrical Works (Philipsdale), Providence, R. I..... . . . . . M
American Enameled Magnet Wire Co., Muskegon, Mich. .... M
American Insulated Wire & Cable Co. Div. of General Cable Co., 954 W. 21st, Chicago, Ill. .... M
American Insulated Wire Corp., Div. of General Cable Co., 45 Baker, Providence, R. I. ..... R F . . A T . .
American Steel & Wire Co., 208 S. La Salle, Chicago, Ill. ..... R F H A T M
Americore. See American Steel.
Amerite. See American Steel.
Amerize. See American Steel.
Amparak. See American Steel.
Anaconda Wire & Cable Co., 25 Broadway, New York, N. Y..... R W . . A . . M
Anaconda Wire & Cable Co., Pawtucket, R. I. ..... R F . . . . . .
Anaconda Wire & Cable Co., Maring Wire Branch, Muskegon, Mich. (Silk, Enamel) . . . . . M
Ansonia Electrical Co., Ansonia, Conn. Silk, Cotton, Enameled..... . . . . A . . M
Armoriokt. See American Steel.
Bay State Insulated Wire & Cable Co., Paydras (Mattapan), 26, Boston..... R . . . . . .
Chicago, Ill. ..... R F H A T M
Belden Mfg. Co., 2310B S. Western Ave.,
Beldenamel. See Belden Mfg. Co.
Beldenite. See Belden Mfg. Co.
Bishop Wire & Cable Corp., 420 E. 25th, New York, N. Y..... R F . . . . . .
Boston Insulated Wire & Cable Co., 65 Bay, Boston, Mass. ..... R F H . . . . .
Bradford, Kyle & Co., Plymouth, Mass. . . . . M
Cablex. See Collyer Insulated Wire Co.
Celatsite. See Acme Wire Co.
Collyer Insulated Wire Co., Pawtucket, R. I. ..... R F H . . . . .
Colorbeston. See General Elec. Co.
Condex. See Simplex Wire Co.
Colorubber. See Belden Mfg. Co.
Copperweld Steel Co., Rankin, Pa..... R . . . . . T . .
Cotenamel. See Belden Mfg. Co.
Cottonite. See Acme Wire Co.
Crescent Ins. Wire & Cable Co., Trenton, N. J. ..... R F H A T M
Darow Mfg. Co., 36 E. 20th, New York. R . . . . . .
Davis-Jones Insulated Wire Co., Pawtucket, R. I. ..... R F H A T . .
Deltabeston. See York Insulated.
Detroit Insulated Wire Co., Detroit, Mich. R . . . . . T . .
Diamond Braiding Mills, Chicago Heights R F H . . . M
Di-Noburn. See Diamond Braiding Mill.
Dreadnaught. See Indiana Rubber Co.
Driver-Harris Co., Harrison, N. J..... R . . H . . . . .
Dudlo Mfg. Co., Div. of General Cable Corp., Fort Wayne, Ind.. . . . . M
Ducatto. See Dudlo Mfg. Co.
Durablit. See Anaconda Wire & Cable Co.
Duracord. See Anaconda Wire & Cable Co.
Durawire. See Anaconda Wire & Cable Co.
Duro. See McEvoy, C. H.
Eagle. See Goldmark Co., James.
Eastern Insulated Wire Co., Tilton, N. H. R . . . . . .
1885. See Chicago Insulated Wire.

Enamelite. See Acme Wire Co.
Enterite. See Rome Wire Co.
Fibrex. See Simplex Wire Co.
Flexible Woven Cable Co., 755 Boylston, Boston, Mass. .... F . . . . . .
Flex-O-Cord. See Packard Elec. Co.
Garco. See General Asbestos Co.
Gavitt Mfg. Co., West Brookfield, Mass. . . . . T . .
GE-Flex. See General Elec. Co.
General Asbestos & Rubber Co., Charleston, S. C. .... H . . . . .
General Elec. Co., Merchandise Dept., W2311, Bridgeport, Conn ..... R F H . . . M
Giant. See Collyer Insulated Wire.
Goldmark Co., James, 83 Warren, New York, Annunciator and Asbestos, Cotton, Silk and Enameled Magnet ..... A . . M
Goodyear Rubber Insulating. See Graybar Electric Co.
Graybar Elec. Co., Graybar Bldg., Lexington Ave. & 43rd St., New York, N. Y. R . . . . . T . .
Grimshaw. See New York Ins.
Hatex. See Hatfield Rubber Wks.
Hatfield Rubber Wks., Inc., Hillside, N. J. ..... R F H . . T . .
Hazacord. See Hazard Insulated Wire Works.
Hazard Insulated Wire Works, Div. of Okonite Co., Wilkes-Barre, Pa.... R F . . A . . .
Holyoke Co., 621 Broadway, New York.. R . . . . A . . M
Inca Mfg. Co., Fort Wayne, Ind..... . . . . M
Indiana Rubber & Insulated Wire Co., Jonesboro, Ind. ..... R F H . . . . .
I. X. L. See Collyer Insulated.
Kable. See Safety Cable Co.
Kenrite. See American Insulated.
Kerite Ins. Wire Cable Co., 30 Church, New York, N. Y. ..... R . . . . . .
Killo. Co., 2 E. 23d, New York..... . . . . T M
Koelle, Frederick C., Real Estate Trust Bldg., Philadelphia, Pa. .... T . .
Lowell Insulated Wire Co., Lowell, Mass. R F H . . . . .
Liberty. See Nat. Metal Molding
Loxsteel. See Hazard Insulated Wire Works.
McEvoy, C. H., Lowell, Mass..... R . . . . . T . .
Marion Insulated Wire & Rubber Co., Marion, Ind. ..... R F H A T . .
Massachusetts Elec. Mfg. Co., West Lynn, Mass. .... M
Montgomery Co., J. R., Windsor Locks, Conn. .... T . .
National Elec. Products Corp., Pittsburgh. R F H A T M
N. E. See Goldmark Co., James.
New York Insulated Wire Co., 114 Liberty, New York, N. Y. ..... R . . . . . .
Nitro. See Belden Mfg. Co.
O. K. See Phillips Wire Co. Also Okocord. See Okonite Co.
Okonite Co., Passaic, N. J..... R . . . . . .
Ozex. See Simplex Insulated Wire
Packard Electric Co., Warren, O..... R F . . . . . .
Parac. See Phillips Wire Co.
Paracore. See U. S. Rubber Co.
Paraflex. See Bishop Wire & Cable.
Paranite. See Indiana Rubber.
Parkerite. See Seward Wire Co.
Peco. See Packard Elec. Co.
Philadelphia Insulated Wire Co., 200 N. Third, Philadelphia, Pa..... . . H A T . .
Phillips Wire Co., Div. of General Cable Corp., Pawtucket, R. I. ..... R . . . . . .
Providence Insulated Wire Co., Providence R F H A . . . .
Raven Core. See New York.
Reliance. See American Steel.
Rockbestos Products Corp., Nicoll & Conner Sts., New Haven, Conn..... R . . H . . T M
Roebling's Sons Co., John A., Trenton, N. J. ..... R F H A T M
Rome Electrical Co., Inc., Div. of General Cable Corp., Rome, N. Y..... . . . . M
Rome Wire Co., Div. of General Cable Corp., Rome, N. Y. ..... R F H . . T M
Ross Wire Co., 69 Bath, Providence, R. I.. R . . . . . .
Romoxide. See Rome Wire Co.
Ruffcoat. See Rome Wire Co.
Runzel-Lenz Elec. Mfg. Co., 1751 N. Western Ave., Chicago, Ill..... . . . . T . .
Safety Cable Co. (Div. of General Cable Corp.), New York ..... R F H . . . . .
Salamander. See York Insulated.
Seward Wire Co., Parkersburg, W. Va. R . . . . . .
Silkenamel. See Belden Mfg. Co.
Silkenite. See Acme Wire Co.
Simcore. See Simplex Wire.
Simplex Wire & Cable Co., 83 Sydney, Cambridge, Mass. ..... R F . . . . . .
Shield. See Ansonia Elec'l Co.
Southern States Cable Co., Div. of General Cable Corp., Mobile, Ala..... . . . . . M
Spiralweave. See Hazard Ins. Wire
Standard Alloy Wire Co., Elizabeth, N. J. . . . H . . . . .
Standard Underground Cable Co., Pittsburgh, Pa. (Div. of General Cable.) R F H A T . .
Sterling. See Standard Undergreund.
Sterling Insulated Wire Co., Fall River, Mass. ..... R . . . . . .
Strand & Sweet Mfg. Co., Winsted, Conn. . . . . M
Suner-Service. See Rome Wire Co.

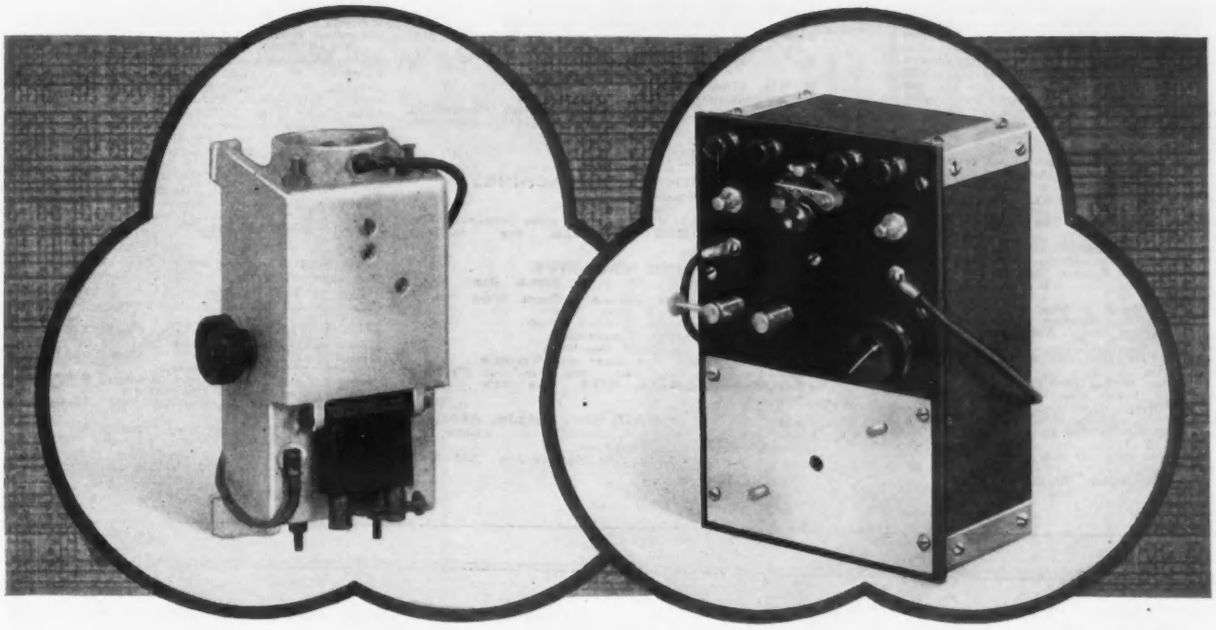
WIRE, Insulated—Continued

Sweetstrand. See Strand & Sweet.
Tip-Top. See Standard Underground.
Tirex. See Simplex Wire & Cable.
Trenchlay. See Rome Wire Co.
Triangle Conduit Co., Dry Harbor Rd. & Cooper Ave., Brooklyn..... R . . . . . .
Tubular Woven Fabric Co., Pawtucket, R. I. ..... R F . . . . . .
United States Rubber Co., 1790 Broadway, New York, N. Y..... R . . H A T .
U. S. Royal. See United States.
Varflex Corp., Rome, N. Y. .... M
Warrior. See American Copper.
Wheeler Insulated Wire Co., Bridgeport, Conn. ..... R F H A T M
White, J. M., 1128 Oliver, Philadelphia, Pa. ..... R F H . . T . .
Whitney Blake Co. See Graybar Electric Co.
Wovenite. See Flexible Woven.
York Insulated Wire Wks. of G. E. Co., 120 Broadway, New York, N. Y..... R . . H . . . M

WIRE MANUFACTURING MACHINES

(See Also Wire Drawing Machines; Insulation, Mixers; Taping Machines, Wire; Wire Polishing Machines; Enameling Machines for Magnet Wire; Wire Wrapping Machines; Vulcanizers, Wire Insulation.)

Armoring Machines .....See A
Braiding Machines .....See B
Bunching Machines .....See S
Covering Machines .....See I
Insulating Machines .....See I
Insulation Straining Machines.....See I



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WIRE MANUFACTURING MACHINES—Continued
Measuring Machines ..... See M
Park Cabling Machines ..... See A
Saturating Tanks ..... See F
Spooling Machines ..... See U
Stranding Machines ..... See S
Tinning Tanks ..... See F
Winding Reels ..... See U

Adamson Machine Co., Akron, Ohio.. I A . . . . . .
Almco-Seward. See American Insulating Machinery Co.
American Insulating Machinery Co., 519 Huntington Ave., Philadelphia, Pa. I A . . . . S U
Breguet. See American Insulating
Crescent. See Royle & Sons, John.
Durant Mfg. Co., 662 Buffum, Milwaukee, Wis. . . . . M . . U . .
Housatonic Machine & Tool Co., Bridgeport, Conn. . . . . I . . . . . U . .
Minneapolis Elec. & Construction Co., 80 S. 12th St., Minneapolis, Minn. . . . . M . . U . .
Nebutteo. See New England Butt Co.
New England Butt Co., 324 Pearl, Providence, R. I. . . . . I A B M S U . .
Peerless. See Royle & Sons, John.
Royle & Sons, John, Paterson, N. J. I . . . . . .
Sleeper & Hartley, Inc., Worcester, Mass. . . . . A . . . S U
Terkelson Machine Co., 326 A St., Boston, Mass. . . . . M . . . .
Textile Machine Works, Reading, Pa. . . . B . . . . .
Universal Wire Machy. Co., 69 Daggett, New Haven, Conn. . . . . A . . . . U F
Utility Mfg. Co., Cudahy, Wis. . . . . I . . . . . .
Wardwell Braiding Machine Co., Central Falls, R. I. . . . . B . . . . . .
Wire Machinery Corp. of Am., New Haven, Conn. . . . . M S U . .
Weir. See Housatonic Machine

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WIRE POLISHING MACHINES
(See Also Wire Manufacturing Machines).
American Insulating Machinery Co., 519 Huntington Ave. Philadelphia, Pa.
New England Butt Co., 324 Pearl, Providence, R. I.

WIRE, Steel Flat
Steel Coating for Armored Conductor.
American Steel & Wire Co., 208 S. La Salle, Chicago, Ill.
Crescent Insulated Wire & Cable Co., 819 N. Oden Ave., Trenton, N. J.
Roebling's Sons Co., John A., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, O.

WIRE STRAIGHTENING MACHINES
Kane & Roach, Syracuse, N. Y.
Shuster Co., F. B., New Haven, Conn.

WIRE TAPING MACHINES. See Taping Machines, Wire
WIRE VULCANIZING MACHINES. See Vulcanizers Wire Insulation.

WIRE WRAPPING MACHINES
Terkelson Machine Co., 326 A St., Boston, Mass.

WOOD BLOCKS. See Cabinets & Boxes, Wood.
Boxes. See Cabinets & Boxes, Wood
Cabinets. See Cabinets & Boxes, Wood
Pulleys. See Pulleys, Composition.
Woods Metal. See Radio Mountings.

WRAPPERS, Paper. See Boxes and Wrappers
WRAPPERS, Tungsten Lamp. See Boxes and Wrappers
WRAPPING MACHINES, WIRE. See Wire Wrapping Machines.

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Ambler Asbestos Shingle & Sheathing Co., Ambler, Pa.
American Asbestos Co., Norristown, Pa.
American Glanzstopf Corp., 180 Madison Ave., New York, N. Y.

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Anchor Thread Co., Trenton (Grovesville), N. J
Asbestos Fibre Spinning Co., North Wales, Pa.
Columbian Rope Co., Auburn, N. Y.
Commercial Rayon & Thread Co., 19 W. 21st, New York.
Ferodo & Asbestos, Inc., New Brunswick, N. J.
Florsheim, H. A., 225 Fifth Ave., New York, N. Y.
Franklin Rayon Corp., 86 Crary, Providence, R. I.
General Electric Co., Schenectady, N. Y.
Great Lakes Yarn & Thread Co., Div. of General Cable Corp., 5133 Wesson Ave., Detroit, Mich.
Johns-Manville Corp., New York, N. Y. (Asbestos.)
Lees Mfg. Co., 320 Broadway, New York, N. Y.
Multiple Winding Co., 77 Summer, Boston, Mass.
Rich & Co., H. S., 180 S. Water, Providence, R. I.
Ryle & Co., Wm., 381 Fourth Ave., New York, N. Y.
Silkulp. See Worcester Bleach & Dye Wks. Co.
Smith & Dove Mfg. Co., Andover, Mass. (Linen Thread.)
Worcester Bleach & Dye Wks., Worcester, Mass.

ZINC
Horse Head. See New Jersey Zinc Co.
New Jersey Zinc Co., 160 Front, New York, N. Y.
Platt Bros. & Co., Waterbury, Conn. (Strips.)
United Metals Selling Co., 25 Broadway, New York, N. Y.

ZINCS AND COPPERS, Battery
Bunker Hill. See St. Joseph Lead Co.
Hunnell & Co., J. H., 32 Park Pl., New York, N. Y.
Eden Mfg. Co., Plymouth, Mass.
Extruded Metal Corp., 184 53rd, Brooklyn, N.Y. (Zinc Cups.)
Franklin. See Grasselli Chemical Co.
Grasselli Chemical Co., Guardian Bldg., Cleveland, O.
Illinois Zinc Co., Peru, Ill.
Lind Mfg. Co. 70 Wyckoff Ave., Brooklyn, N.Y. (Zinc Cups.)
Matthiessen & Hegeles Zinc Co., La Salle, Ill
New Jersey Zinc Co., 160 Front, New York, N. Y.
St. Joseph Lead Co., 250 Park Ave., New York, N. Y

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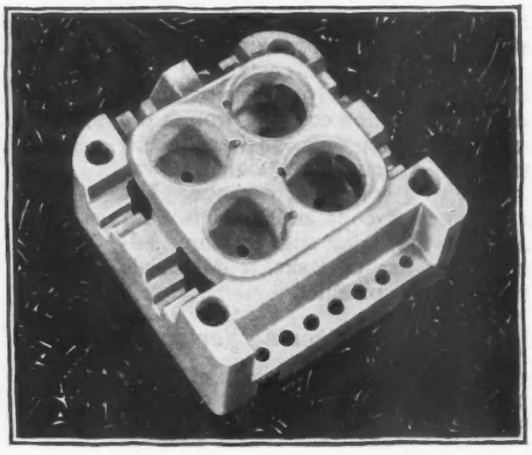

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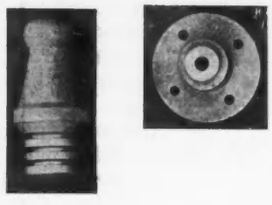

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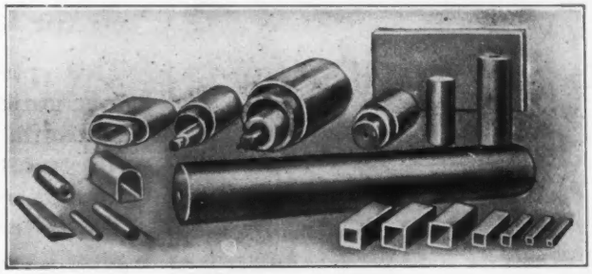

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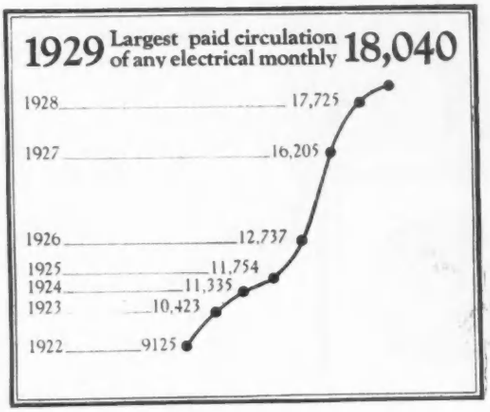
The General Industries Company

ESTABLISHED 1875 · · ELYRIA, OHIO



Since 1892

▼▼▼ a constantly growing market represented by a consistently increasing paid circulation . . . at the industry's peak today.

FOR 37 years, the publishing service of ELECTRICAL RECORD has kept pace with the growing needs of the electrical industry. How well it has succeeded is evidenced by its dominant position in the electrical business press.

The highest paid circulation, the highest average subscription renewal percentage over the past decade, the lowest cost per 1000 unit of paid circulation—these are rigid yardsticks by which to measure the real worth of ELECTRICAL RECORD. In any advertising plan directed to electrical buyers, ELECTRICAL RECORD has earned primary consideration.

Gage List
OF ELECTRICAL BUYERS

The trade authority since 1892

The content of the Gage List is the cornerstone of the foundation upon which is built the circulation of ELECTRICAL RECORD. The list is combed for the best and most outstanding buyers, those that are the long established and permanent buying factors. The result of this double check or sifting process produces the most select and worthwhile buyers.

THE GAGE PUBLISHING CO., Inc.
461 Eighth Avenue, New York, N. Y.

Brawley felt feet
....give your product the *permanent* protection it deserves

Brawley Felt Feet are furnished with machine or wood screws and nails. Look for the name stamped on every piece.

WE have made BRAWLEY FELT FEET a quality product for electrical manufacturers who want permanent protection for their products. The most exhaustive tests have proved them practically indestructible.

BRAWLEY FELT FEET are made with nails, wood screws or machine screws. Look for the name on each one; it is a guarantee of genuineness.

We carry large stocks, and can fill orders for standard goods immediately. We are always glad to help with special problems.

T. R. BRAWLEY
279 20th Street, Brooklyn, N. Y.

From the mould to moulding

—we control every process. Not only do we assure accuracy in the moulds by making them ourselves, but we guarantee uniformity in every piece moulded (*in Bakelite, of course*) and the promise of delivery.

KUHN & JACOB MACHINE & TOOL CO.
502 Prospect Avenue *Trenton, N. J.*

FIBRE
Hard Vulcanized

Laminated Bakelite

Specialists in punchings and special shapes—one or a million pieces to your requirements—*quickly*

FRANKLIN FIBRE SPECIALTY CO.
Wilmington, Del.
N. Y. Office and Warehouse:
173 Lafayette St. Canal 9125

SHEETS — RODS — TUBES WASHERS — SPECIALTIES

This *flexible* Super-Micanite *formed without applying heat*

BEND it when cold to fit an armature slot . . . a commutator core . . . a field coil! No heat is necessary to form flexible Super-Micanite, because of the great flexibility and adhesivity of its special cement.

The extremely high dielectric strength of this flexible Super-Micanite allows it to be used in very thin sheets. It is particularly desirable as an insulator for oil-cooled transformers because it is not seriously affected by immersion in hot oil, at temperatures up to 270° F. There's a real test for any flexible mica insulation! Apply it . . . and compare!

Flexible Super-Micanite can be stripped into narrow widths. Used in this form, it makes a most efficient insulator for conducting wires and cables, possessing—as it does—high puncture voltage.

We will gladly send samples for test.

Empire Oiled Insulations; Super-Micanite, and Micanite bonded mica insulation; Mica Insulating Varnishes, Compounds, Cements, Friction and Rubber Tapes are products of the Mica Insulator Company.

MICA INSULATOR COMPANY

New York: 200 Varick Street Chicago: 542 So. Dearborn Street

Cleveland Pittsburgh Cincinnati Birmingham Seattle San Francisco Los Angeles Toronto Montreal *Works:* Schenectady, N. Y. London, England

PERFECT MICANITE INSULATOR REG. U.S. PAT. OFF.

Electrical INSULATION

PERFECT EMPIRE INSULATOR REG. U.S. PAT. OFF.

MICA INSULATION OILED CLOTH INSULATION

Cut Your Costs

By the use of Die Cast Parts

Illustrated here are only a few castings where substantial savings have been effected, due to partial, and in some cases, total elimination of costly machining operations. Castings are made from Aluminum, Zinc, Lead and Tin Base metals, alloyed to suit your particular requirements.

Send Blue Prints or Samples for Quotations

DIE CASTING DIVISION

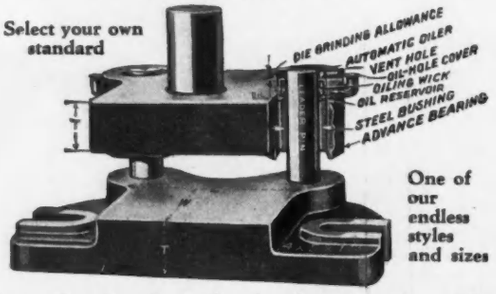
Barnhart Brothers & Spindler

Monroe and Throop Streets, Chicago

Get our new 120-page Die Set Guide

Listing 70,000 Sizes

Select your own standard



One of our endless styles and sizes

Baumbach Standard Automatic Oiled

DIE SETS

Made of 25% Steel

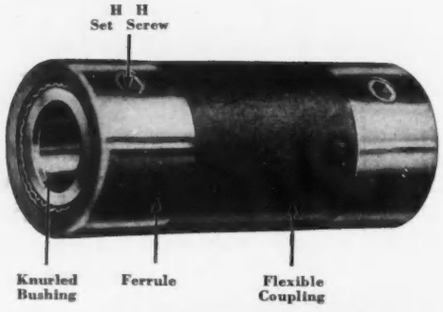
The Product That Built Our Modern Plant

E. A. BAUMBACH MFG. CO.

GENERAL OFFICE & WORKS

1810 SOUTH KILBOURN AVENUE, CHICAGO, ILLINOIS

ONEIDA



FLEXIBLE COUPLING

on your product will make it a lot easier to sell—

Not just "added sales talk" but real sales recognition comes to the washing machine, oil burner, etc., equipped with one of these "shock absorbers." A two-fold protection—to distributor and customer—it gives longer and safer service, does away with vibration, and eliminates lost motions.

Equip your product with the Oneida Flexible Coupling.

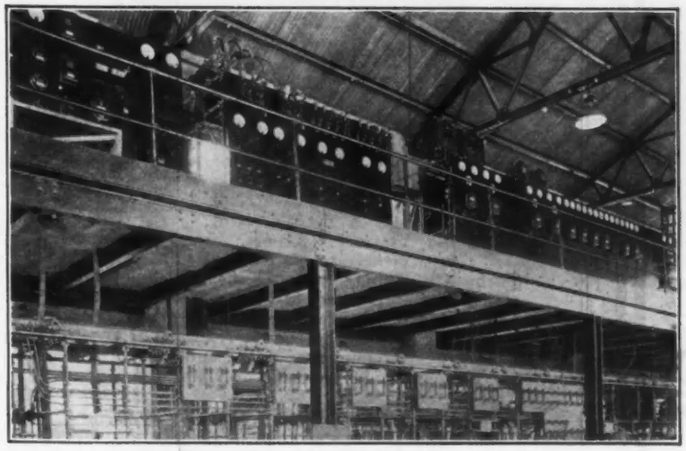
DELBEE RUBBER CO.
Syracuse, New York

Ambler Asbestos

CORRUGATED ROOFING AND SHEATHING

NOW AVAILABLE IN A NEW DRESS!

Ambler now provides color in industrial roofing—a pleasing mixture of red and gray, making your factory buildings and warehouses more attractive—at the same low price as the conservative plain gray which has served industry so well—Fireproof, Enduring, Economical—and now, COLORFUL!

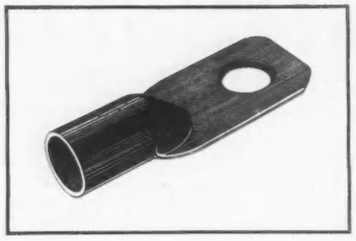


It will be of advertising value to you to have a well-groomed, attractive plant. The new Ambler Corrugated will aid materially and at the same time provide a fireproof, lasting roofing or siding which will efficiently house your warehouses, elevators or factory buildings. The red color on these sheets is part of the material itself and will not wear off.

The picture on the upper left shows the simple, inexpensive application. At the lower left is a factory with Ambler Asbestos Corrugated on the roof and Ambler Ebonized Asbestos Lumber used for switchboard panels.

Send this coupon to AMBLER Asbestos Shingle & Sheathing Co., Ambler, Pa., for further details.

Gentlemen:
Please send information on
☐ Ambler Asbestos Corrugated
☐ Ambler Ebonized Asbestos
Name .....
Company .....
City .....
EM



Better Lugs and Connectors

Conductivity 98%
Electrolytic Copper 99.85 + Pure
Cut Even at Ends
Perfectly Bright All Over
Accurately Sized to Fit
Plain or Tinned
All Sizes and Styles
Fast Deliveries From Stock
Priced Right

We Want to Quote Where Quality Counts

WOLVERINE TUBE CO.

SEAMLESS COPPER BRASS & ALUMINUM

1431 Central Ave. Detroit, Mich.

Sales Offices: Cleveland; Chicago; Atlanta; Los Angeles; Denver; Dayton, Ohio; New York City; Dallas, Texas

Specially Shaped

Sponge and Solid Soft Rubber products—for hundreds of electrical uses

TOYCO (Reg. U. S. Pat. Off.)

The many points of contact where insulating protection is needed to absorb shock, vibration and microphonic noises can be taken care of in a satisfactory manner with "Toyco" Sponge and Solid Soft Rubber Specialties.

All "Toyco" products are made of virgin rubber to guarantee good aging quality and efficient service.

"Toyco" Sponge Rubber is a low-gravity stock and can be supplied in many degrees of density, either in standard sheets 20"x 20" or die-cut and moulded for special purposes.

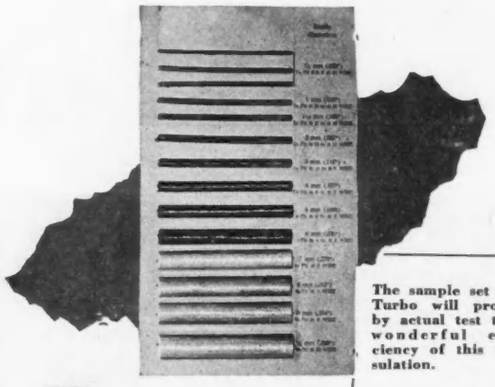
Send blueprints or detailed specifications and we will submit full particulars and prices.

The Toycraft Rubber Co.

Dept. "W" Ashland, Ohio

TURBO OIL TUBING

—wonder insulation



The sample set of Turbo will prove by actual test the wonderful efficiency of this insulation.

DON'T let acids, vapors, gases or moistures be a menace to electrical circuits. Use our Turbo Oil Tubing—a tough flexible "spaghetti" which is impregnated inside as well as out to provide adequate protection. Like glass on the surface: Send for the sample set for a test. Mica products, condenser paper and TURBO filling compound is also made at

WILLIAM BRAND & CO.

268 Fourth Ave., New York City

Chicago St. Louis Detroit San Francisco Los Angeles

Brandywine FIBRE

means anything made from fibre tubing as a base

We could publish lists and lists of what we make but it is enough to say that we make *anything* that can be made from fibre tubing as a base. In addition, electrical manufacturers will find a special service efficient in workmanship, economical in proper application and quick in accomplishment.

"You'll find the right fibre supplies in the Brandywine Service."

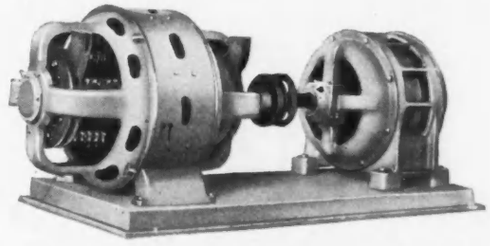
BRANDYWINE FIBRE PRODUCTS CO.

1402 Walnut Street Wilmington, Del.

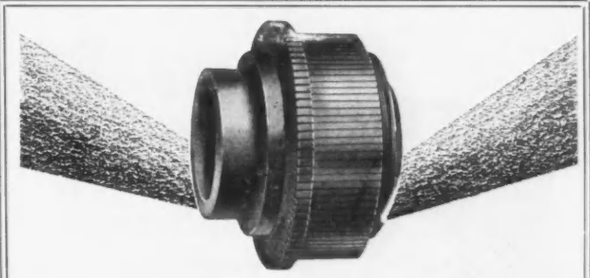
Columbia electroplating generators are the greatest value by 13 distinctive features

1. Welded steel frames.
2. Bracket bearing construction.
3. Forced ventilation.
4. One-piece construction of brushholder and stud.
5. Fool-proof, trouble-free rocker arm and collector rings.
6. Independent motor driven exciter.
7. Four bearing type motor generator sets.
8. Centralized control panels with instruments.
9. Compactness.
10. Light weight.
11. Perfect commutation without the need of interpoles.
12. Timken double-row roller bearings.
13. General Electric motors.

The importance of these definite advantages is explained in Bulletin C-100. Built in sizes of 100 to 10,000 ampere capacity. Popular ratings can be shipped immediately. Double commutator type Columbia generator or motor generator sets are furnished for either 6 and 12 volts or 7½ and 15 volts. 5000 ampere 6 volt 2500 ampere 6 volt Columbia generator driven by a General Electric induction motor. Overall length 106⅝"; width 32¼"; height 36⅜". Weight 4500 lbs.



Columbia Electric Manufacturing Co.
1292 E. 53rd St., Cleveland, Ohio



Commutators–

and other parts

Leading manufacturers of electrical equipment are depending on "EUREKA" as their regular source of supply for Commutators, commutator bars (forged, drawn or cast), Brush Holders, Copper Leaf and Gauze Brushes. Collector Rings and Soles. Controller fingers, segments, field plates, etc. Switches. Non-ferrous castings and drop forgings.

Highest quality parts at reasonable prices, and prompt deliveries.

Will be glad to figure with you on all or part of your requirements—write us.

EUREKA METAL PRODUCTS CORPORATION
91 CLAY STREET, NORTH EAST, PA.

EUREKA

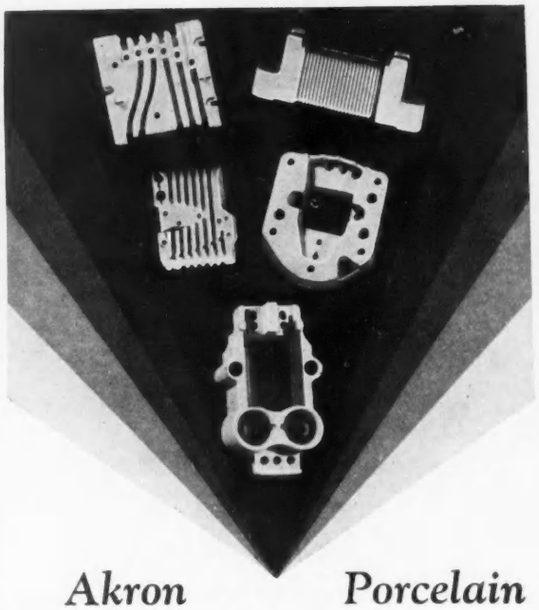
Porcelava

The best for Electric Heating Appliances

Our clay specialties, plain and threaded tubes, and Refractory Porcelain for Electric Heating Appliances are superior in every way; and "PORCELAVA" makes the best Pyrometer Insulation.

Burgess & Company
East Liverpool, Ohio
Factory at Wellsville, O.

Chicago Representative:
F. D. FARNAM & CO.
389 No. Wells St., Chicago, Ill.



Akron Porcelain

Well formed - - - Strong
Accurate - - - Good appearance
Reasonable Prices

THE AKRON PORCELAIN CO.
Akron, Ohio
Formerly the Mogadore Insulator Company

REFRACTORIES
that perform in high class company

ONLY the best products are equipped with our refractories. This is because they are made to maintain high standards which electrical manufacturers recognize as necessary for customer satisfaction.

Our refractories stand the test of time and trial. Under high heat, they are continually efficient, under sudden temperature changes they do not spall or split off. No rough edges to injure the metallic resistor. This reliability is due to fine quality.

In addition to our complete line for electric ranges and other household appliances, and tubes and cores for all resistance windings, threaded or plain, we also make refractory heating element supports for electric furnaces.

Furthermore, we are ready to give individual attention to any refractory problem—*if you will send us your specifications.*

THE ELECTRICAL REFRACTORIES COMPANY
East Palestine, Ohio

The Beacon
guiding you straight to porcelain satisfaction

Porcelain buying is not a gamble or a matter of guess work if you specify or insist upon geting STAR Quality. Star Porcelain is real quality and yet the price is as low as some inferior kinds. Let STAR Quality guide you

The STAR
PORCELAIN COMPANY
TRENTON NEW JERSEY

A Machine Is as Old as Its Seal!

More tell-tale than a horse's teeth, the type of packing used in your machine betrays your knowledge of modern improvements in design. The Cooke Seal Ring is making old-fashioned rings or packing obsolete on the revolving shafts of machines for every purpose. Leak-proof, almost frictionless, non-wearing, trouble-proof, economical to install, low-priced itself—the Cooke Seal Ring is something you ought to thoroughly know about.

COOKE Seal Ring

46 N. Green St.,
Chicago, Ill.
Dept. T

Equipment Engineers

WILL BE INTERESTED IN THIS ADVERTISEMENT

A new advanced method of heating process materials has been perfected. You need no longer tolerate scorched and burned materials, lost time due to constant watching and adjusting of temperatures, faulty pouring, offensive fumes and dangerous fire hazards.

The new STA-WARM heater for electrical plants is equipped with an automatic control thermostat, heated full way valve or needle valve operated by foot pedal.

Heats any material which melts under 450° F. Built in standard sizes from one quart to 50 gallons. Special sizes up to 100 gallons. Adaptable to hundreds of production processes. Write for complete details.

BECKWITH MACHINE COMPANY
402 Chestnut St. Ravenna, Ohio

Sta-Warm
AUTOMATIC ELECTRIC HEATERS

Thanksgiving

As pioneers in a new country our forefathers found happiness with a strong mixture of hardship and misery. Yet they, being philosophical souls, also found plenty for which to be thankful.

We of today may be inclined to cry out at the fates that besiege us although we have a thousand times more for which to be thankful than the happiest pilgrims that ever lived.

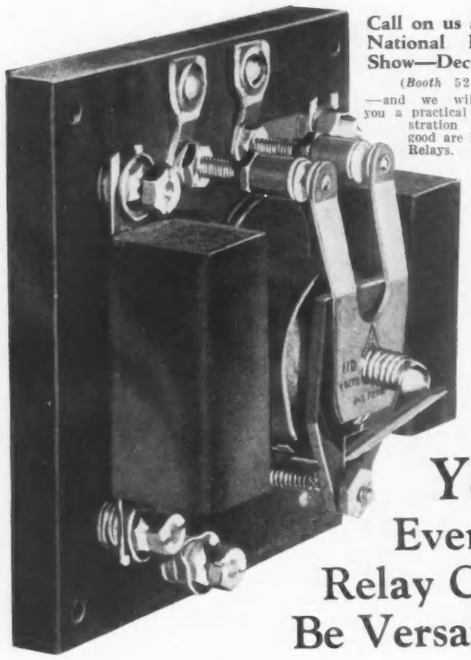
The Leland Company now has a fine new factory, a still finer motor than ever before, greater production than was ever dreamed of a short while back—for all of which they are duly appreciative.

A.C. Single Phase Induction
D.C. Compound Wound
A.C. Polyphase

All in Interchangeable Frames

The Leland Electric Co.
Dayton, Ohio.
U. S. A.

Leland fractional horsepower Motors



Call on us at the National Power Show—Dec. 2-7, (*Booth* 520)
—and we will give you a practical demonstration of how good are DUNCO Relays.

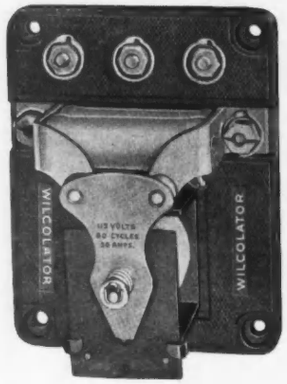
Yes, Even a Relay Can Be Versatile

—quick as lightning, positive as earth's gravity. DUNCO Relays are used in a multitude of current control jobs where a lot depends on *dependability*. DUNCO Relays are carried in stock or we'll build 'em "special".

This No. 466 is for electric range and a dozen other current control jobs.

STRUTHERS DUNN, INC., *138 N. Juniper St., Philadelphia, Pa.*

Here's a relay that never gets tired



Type R

We solicit your relay and thermostat problems. Give us full details and let us help you.

It is a husky, single pole, double break relay with large silver contacts that will withstand years of continual operation without replacement of any parts.
It is the relay that established its reputation for reliable service on the famous WILCOLATOR Electric Oven Heat Control.
This is only one of the many types of relays WILCOLATOR is producing—the line is extensive.

The

WILCOLATOR
Company
Newark, New Jersey

2,500 tests an hour

Such is the speed with which an unskilled operator can check electrical parts with the aid of a

RUBICON Rapid Testing Instrument

If you have a problem involving quantity testing of **resistances, heater coils, fuses, grid leaks, condensers —large or small, inductances, chokes, tranformers, vacuum tubes,** etc., we can save you both time and money.

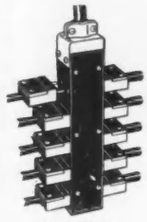
Place your problem before us today

RUBICON COMPANY
Makers of Precision Electrical Instruments
29 No. Sixth St., Philadelphia, Pa.

CONNECTORS
for
ELECTRICAL DEVICES

No. 950

No. 990


No. 2954

PIN-PLUG connectors for electric appliances, apparatus, and portable devices are made by Kliegl in many different types and sizes, meeting innumerable requirements. They will withstand severe usage; are in accord with Underwriters' requirements; capacities range from 5 to 200 amperes; types range from single-pole to eight-pole connectors, also multiple circuit and branch-off; special designs are made to order.

Write for
CONNECTOR BULLETIN
No. 102

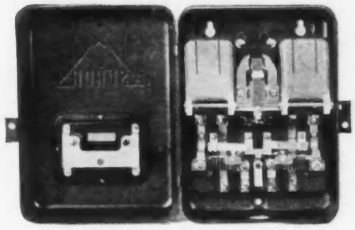
No. 8950-B

No. 995

No. 2950

KLIEGL BROS
UNIVERSAL ELECTRIC STAGE LIGHTING CO., INC.
321 WEST 50th STREET
NEW YORK, N.Y.

6013 *Aclinestor Form M.C. full voltage automatic starter push button control.*



Form M. C. Aclinestor with cover open.

Sundh 6013 Aclinestor

—the motor starter that has been tested against every conceivable cause of breakdown

THE testing has all been done for you—every doubt as to positive performance removed *finally*.

Built ruggedly in all details; all parts cadmium plated; no iron current-carrying parts; coil and contacts instantly removable; cold moulded asbestos arc shields; contact support bar of reinforced Bakelite; connections go straight from line to load; thermal overload reset from outside the box—many, many other features that are distinctly SUNDH in originality.

Write for details relative to our offer of a sample switch for inspection and application to your problems.

SUNDH ELECTRIC CO., INC.
Parkhurst St. at Ave. C, Newark, N. J.

Representatives and Branch Offices:

BIRMINGHAM, J. W. Eshe'man, 1220 American Traders Bank Building.
BOSTON, Hasmer R. Kimball, 176 Federal St.
BUFFALO, W. T. Quimby, 1010 Morgan Bldg.
CHICAGO, Thos. E. Beasley, 333 N. Michigan Ave.
CINCINNATI, R. M. Heim, 2413 Union Central Bldg.
CLEVELAND, Gordon H. Gildersleeve, 439 Terminal Tower Bldg.
DENVER, Joy & Coz, Inc., 314 Tramway Bldg.
DETROIT, R. D. Ernest, 1420 David Stott Bldg.
LOS ANGELES, Otto Demmert, 106 W. Third Street.
MINNEAPOLIS, H. R. Harris, 708 6th Avenue, South.
NEWARK, L. L. Wilcox, Parkhurst St. at Avenue C.
NEW ORLEANS, L. C. Reed, 1230 Hibernia Bank Bldg.
NEW YORK CITY, P. W. Moeller, 51 E. 42nd St.
PHILADELPHIA, H. F. Darby, Jr., 1700 Sansom Street.
PITTSBURGH, Rutherfoord & Uptegraff, Clark Bldg.
ST. LOUIS, D. O. Stewart, 619 Bank of Commerce Bldg.
SAN FRANCISCO, Utilities Equipment Corp., 1644-A Russ Bldg.
SEATTLE, Thomas S. Wood, 220-222 9th Ave., North.
VANCOUVER, B. C., Phillips-Henderson Co., 500 Beatty St. (Bekins Bldg.)

No. 44

Universal Motor for 110 Volts

Suitable for phonograph drives, drink mixers, sewing machines, small Lathes, etc.
Battery motors and small generators our specialty. Send for circular.

LIBERAL DISCOUNTS TO DEALERS.

KENDRICK & DAVIS CO.
LEBANON, NEW HAMPSHIRE

Send for Catalog **Strand** *The Standard Line*

FLEXIBLE SHAFT EQUIPMENTS MANY TYPES AND SIZES ⅛ to 2 H.P.

Power screw driving attachment.

Manufactured by
N. A. STRAND & COMPANY, 5001 N. Lincoln St., Chicago, Ill.

SORGEL AIR-COOLED TRANSFORMERS

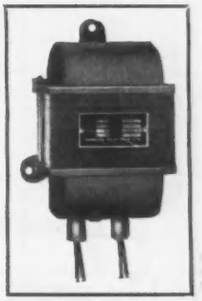
WITH CONDUIT CONNECTIONS

Booster Auto Transformers

for A.C. Network Systems

199 to 220 Volts
208 to 230 Volts
Also Other Ratios
} Single Phase and 3-phase

Sizes 1 to 500 KVA.



Being air-cooled, they can be installed easily in any convenient place inside of building, without enclosures or fire-proof vaults, and meet the requirements of the Underwriters.

Ask for Bulletin 1029-B

SORGEL ELECTRIC CO., 89 W. Water Street, Milwaukee, Wis.

Electrical Resistance *without* Sales Resistance

A PRIMARY factor in electrical manufacturing today is SPEED OF DELIVERIES.

Without it, an element of sales resistance—through delayed deliveries of your own—is often created. With it, and a bit more of it than would normally be expected, you create a genuine advantage over competition.

72 hours is all we need to mail samples made to order

Hardwick, Hindle, Inc., specializes in Resistors of the highest grade. Our standard numbers include a wide variety of sizes, types, capacities and mountings.

We are interested also in cooperating with manufacturers who need specially designed and manufactured Resistors. A thoroughly organized Rush Order Department is prepared to handle such orders in any volume.

Samples built precisely to your specifications will be on their way to you within 72 hours after we receive your specifications.

We will welcome an opportunity to demonstrate how "HH" speed of service can cut down *your* sales resistance.

RESISTORS

May we send our catalog?

Catalog No. 429 illustrates our line of stock models, and offers a complete choice of units with which to build up special Resistors fitted exactly to your requirements. It also brings you Resistance Tables which should prove decidedly helpful in your calculations.

HARDWICK, HINDLE, INC.
Sales: 122 Greenwich Street, New York City
Factory: 215 Emmet Street, Newark, N. J.

UNION

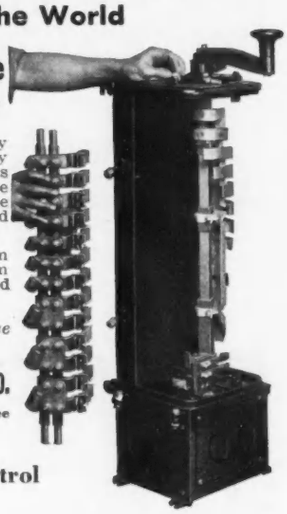
The Most Complete Line of Drum Controllers in the World

Easily Removable Finger Assembly

Entire finger assembly can be removed by simply removing two cap screws in the top and one in the bottom. The complete cylinder can be lifted through the top head.

All parts are cadmium plated, except the drum frame which is finished in baked black Japan.

For complete details, see our Publication 500.



UNION ELECTRIC MFG. CO.
934 Juneau Ave., Milwaukee
Manufacturers of
Electric Motor Control Apparatus

Also Associated Manufacturer with, and Eastern Distributor for
DIAMOND (E) ELECTRICAL MFG. CO., *Los Angeles, Cal.*
Magnetic Motor Control Apparatus

SIGNAL
MANUFACTURERS OF ELECTRICAL PRODUCTS

Motors

Universal and induction type small fractional horsepower motors to meet all requirements for small motors. Send us your specifications. SIGNAL ELECTRIC MFG. CO.
Menominee, Michigan
Small Motor Specialists Since 1890.

★NATIONAL★

RHEOSTATS

FOR SMOOTH AND GRADUAL CONTROL OF—

Adjustable Resistance At Its Best
SMALL IN SIZE
LIGHT IN WEIGHT
HIGH IN QUALITY
LOW IN PRICE
LONG IN LIFE

FINE CONTROL

MOTORS, GENERATORS
HEATERS, FILAMENTS
ARCS, TRANSFORMERS
MAGNETS
LABORATORY
APPARATUS
ETC., ETC.

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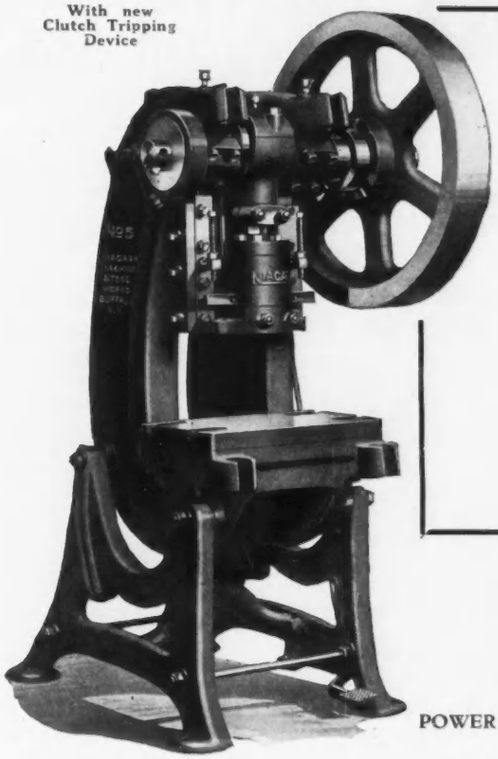

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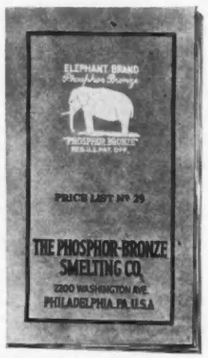

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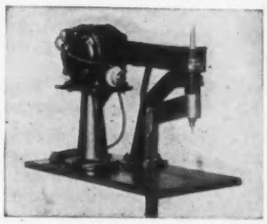

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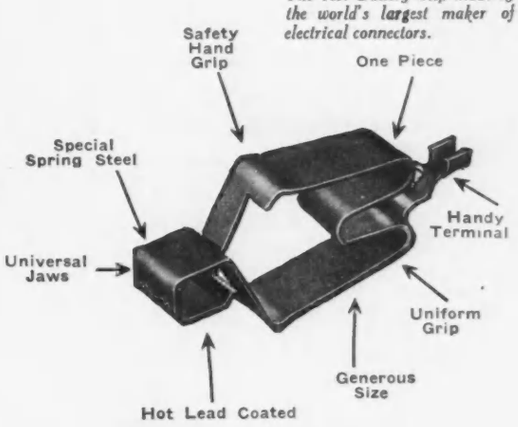

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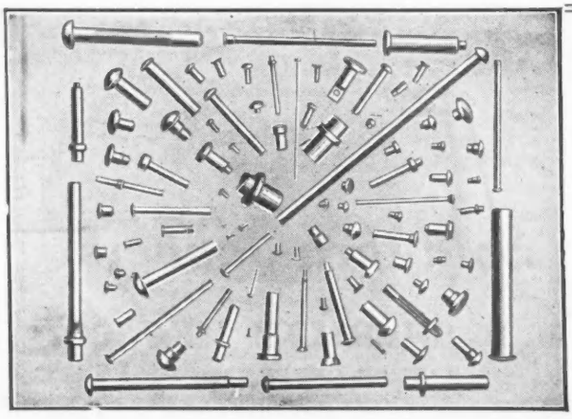

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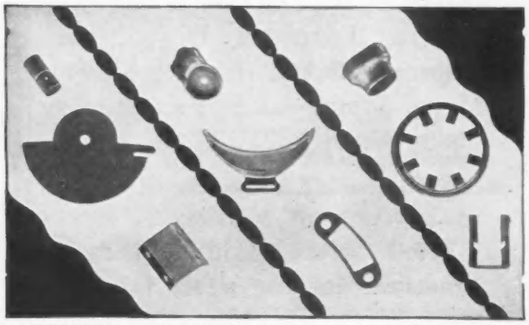

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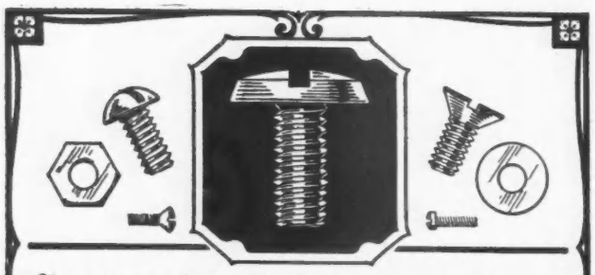

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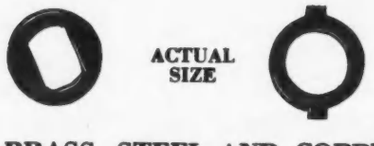

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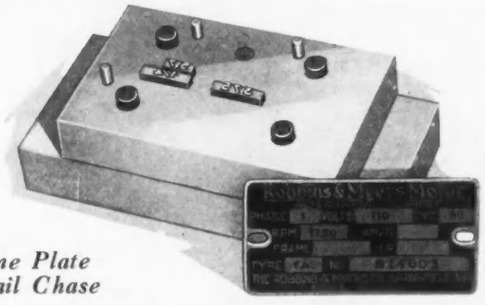

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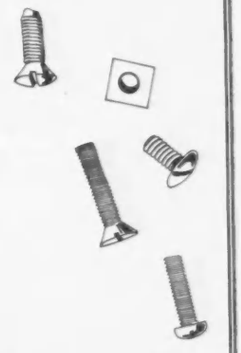

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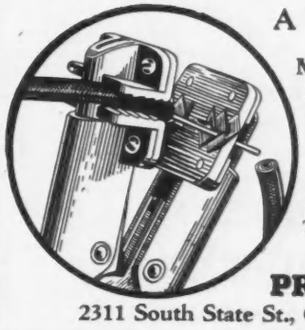

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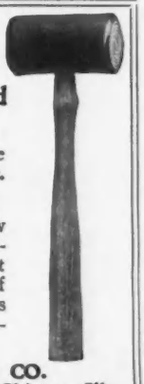

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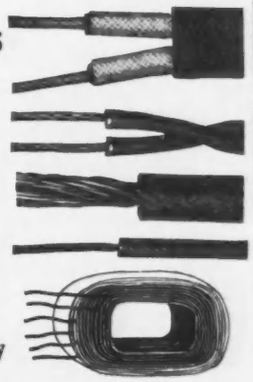

The Wire Stripper Company
507 Erie Bldg., Cleveland, Ohio

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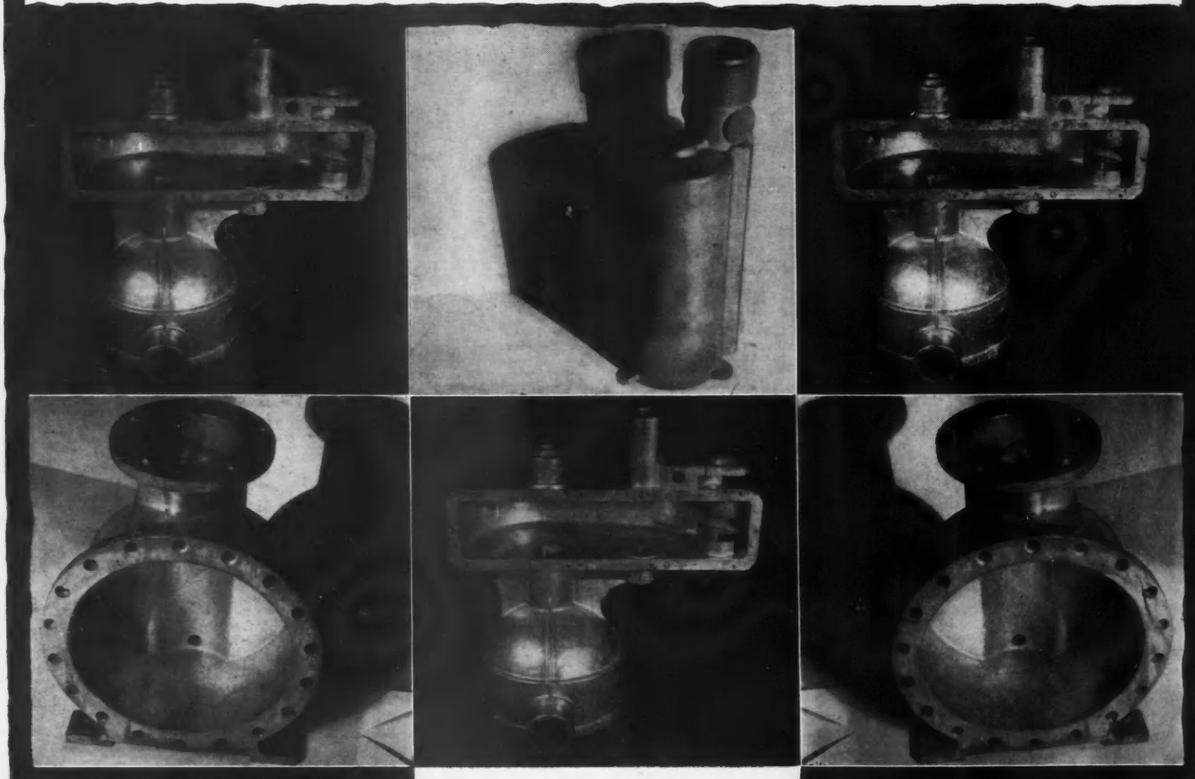

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